THE OHIO JOURNAL OF SCIENCE

Volume 86 | April Program Abstracts | No. 2

CONTENTS

95th Annual Meeting
The Ohio Academy of Science

Hosted by
The University of Toledo

April 25-27, 1986

Theme: Ohio's Research Community:
LINKS WITH THE WORLD

Schedule of Technical Section Meetings
and
Poster Sessions

GENERAL SCHEDULE

Except as otherwise indicated, all sessions and events are on the campus of the University of Toledo.

FRIDAY, APRIL 25, 1986

8:30 A.M. — Registration for Section S. Library and Information Science and symposium in the Ward M. Canaday Center, William S. Carlson Library See page 57.

Registration for Section Q. Economics and the symposium in the Driscoll Center for Continuing Education. See page 49.

10:00 A.M. — OAS Executive Committee in the Driscoll Center for Continuing Education, Room 6.

12:00 NOON — Lunch in the Driscoll Center for Continuing Education, Dining Room A.

2:00 P.M. — OAS Council meeting in the Driscoll Center for Continuing Education, Rooms 11 & 12.

3:00 P.M. — Ohio Biological Survey Executive Committee meeting in the Driscoll Center for Continuing Education, Room 6.

5:30 P.M. — Joint OAS Council and OBS Advisory Board Dinner in the Driscoll Center for Continuing Education Dining Room B. Reservations required and limited to members and guests of the OAS Council and OBS Board.

8:00 P.M. — OBS Advisory Board Meeting in the Driscoll Center for Continuing Education Rooms 11 & 12.

8:00 P.M. - 10:00 P.M. — All Academy Welcoming Reception. Cash bar in the Driscoll Center for Continuing Education Dining Room A. Members and visitors welcome.

SATURDAY, APRIL 26, 1986

8:00 A.M. - 3:00 P.M. — Registration in Student Union Ingman Room

9:00 A.M. — Poster Session in Student Union Ingman Room

Section Meetings. See Contents for specific section programs.

11:00 A.M. — All-Academy Lecture in the Law School Auditorium

Mel Hartmann, Director
Research and Technology Assessment
NASA - Lewis Research Center, Cleveland

"Powered Flight - From the Bicycle Shop into the 21st Century"

12:00 NOON — Lunch (reservations required) Student Union Room 200

1:30 P.M. — Section Business Meetings See Contents for specific section.

2:00 P.M. — Afternoon Poster Sessions and Section Meetings

5:00 P.M. - 6:30 P.M. — Hospitality Hour in the Driscoll Center for Continuing Education, Second Floor Lobby.

6:30 P.M — Annual Banquet and Awards Ceremony (reservations required)

Presidential Address by
Dr. Paul M. Daniel
Miami University

"Biology and Biologists on and off the Buckeye Trail"

9:00 P.M. — Annual Business Meeting for members only in the Driscoll Center for Continuing Education rooms 9 & 10.

REGISTRATION & PARKING

REGISTRATION is required for all meeting participants. See registration form inside back cover.

+++ Access to meeting rooms by name tag only +++

Pick up name tag at registration desk
BEFORE attending sessions.

Meal reservations and payments must be postmarked by Monday, April 21, 1986.

Make checks payable to THE UNIVERSITY OF TOLEDO and mail to:

The University of Toledo
Division of Continuing Education
OAS Registration
Toledo, OH 43606

Phone (419) 537-2031

FRIDAY, APRIL 25, 1986

Parking for Section S. Library and Information Science and symposium on "Ohio Based Information Organizations - Data Links with the World". Park in Lot #13 off Campus Road on the west side of campus. If travelling east on Bancroft, turn right at the first light after Secor Road. Turn right again when you see the lot and follow the road to entrance on the west side of lot. To reach the library, follow the walking path (across the street from Bowman Oddy Laboratories) between the ROTC Center and the physical plant. This path leads to a wide walkway between the Student Union and Carlson Library.

Registration will be on the 5th floor of the library from 8:30 - 10:00 A.M. If you arrive after 10:00 A.M., please register at the Driscoll Center for Continuing Education (above) before going to the Library.

Parking for Section Q. Economics and symposium on the "Economics of Biotechnology" Park in Lot #17 behind (north of) the Driscoll Center for Continuing Education. If travelling east on Bancroft, turn left (north) at the third after Secor Road.

Registration in the Driscoll Center.

SATURDAY, APRIL 26, 1986

Parking available in lots #1-N and 1-S on the east side of the campus, off University Hills Blvd. If travelling east on Bancroft, turn right (south) at the third light after Secor Road. Use lot on right. Additional parking is available in the east ramp on your left. There is no charge for parking.

Registration, materials, poster sessions, and coffee will be available in the Ingman Room on the second floor (2500 level) of the Student Union. Enter at the top of the steps on the north side (mall side) of the Student Union. The Ingman Room is straight ahead, through the lounge.

MEALS

Advance reservations required. See registration form

Friday, April 25	Luncheon	$7.00
Saturday, April 26	Luncheon	$7.00
	Banquet	$10.00
Sunday, April 27	Geology Field Trip Box lunch	$4.00

On Saturday, April 26, 1986 the following on campus restaurants will be open:

Angelo's Attic - pizza
Student Union - 4th floor
Open at 11:30 A.M.

Parks Tower Cafeteria (dorm)
Please advise registration staff before 10:00 A.M.

Mediterranean Room (Greek) Student Union - 3rd floor Carry out window only

Information on local restaurants available at registration.

Also see page

HOUSING

Registrants wishing to stay in Toledo are expected to make their own reservations. See Contents for map.

SPECIAL EVENTS & FIELD TRIPS

FRIDAY, APRIL 25, 1986

9:35 A.M. Ohio-Based Information Organizations: Data Links With The World

This symposium will be held Friday, April 25, 1986 from 9:35 to 11:35 a.m. at the Ward M. Canaday Center in the William S. Carlson Library. Representatives of Chemical Abstracts Service, ERIC Clearinghouse for Science, Mathematics and Environmental Education, Mead Data Central, OCLC and Predicasts will participate in an examination of the role Ohio-based information organizations play in the advancement of scientific research communication throughout the world. Participants will discuss printed and computerized information services they offer to the academic, scientific and business research communities worldwide. (See Section S, Information and Library Science abstracts).

12:00 NOON - 5:00 P.M. Open House at the Department of Mechanical Engineer's Robotics Laboratory

The Department's Robotics Laboratory, located in Room 1204 on the first floor of the Engineering Science building will be open to visitors. Take this opportunity to view industrial and laboratory teaching robots in action, as well as discuss the exciting area of robotics with faculty and students active in the field.

3:45 P.M. Panel Discussion of Library Directors

The panel discussion will be held on Friday, April 25, 1986 from 3:45 p.m. to 4:35 p.m. at Ward M. Canaday Center in the William S. Carlson Library. The directors of the Bowling Green State University Libraries, The University of Toledo Libraries, The Raymon H. Mulford Library of the Medical College of Ohio at Toledo, and Toledo-Lucas County Public Library system will participate in a discussion of how libraries in general and theirs in particular aid in research and promote excellence. (See Section S, Information and Library Sciences abstracts.)

6:00 P.M. Maumee Bay Boat Trip

Maumee Bay is a shallow embayment of Lake Erie located at the mouth of the largest of the Great Lakes tributaries. Lining the shores of the Lower Maumee River are commercial and industrial development of the City of Toled. Further in the Bay the shoreline becomes residential and agricultural in character. In Maumee Bay, waters from the Lower River mix with water from Lake Erie creating a productive ecotone. Limnological measurements and plankton sampling, taken on the field trip, will illustrate the ecotone nature of the Bay. The trip will leave the Law School Parking Lot, adjacent to the Department of Biology, at 5:30 p.m. and return at approximately 9:00 p.m. Transportation will be by private car, however, carpooling is desirable. The trip will be limited to twenty people. Those wanting to participate should contact Dr. Peter Fraleigh of the Biology Department, The University of Toledo, (419) 537-2125.

7:30 P.M. Ritter Planetarium

Ritter Planetarium will feature, "Planets of Ice," a program based on the Voyager encounter of Uranus. The Voyager mission and the relation between the outer planets, their ice moons, and comets will be discussed.

8:30 P.M. Ritter Observatory

Open house viewing with the Ritter 1-m telescope will be conducted from 8:30 p.m. - 10:30 p.m., weather permitting.

SATURDAY, APRIL 26, 1986

9:00 A.M. Tour of Psychology Laboratories

Members of the Psi Chi, the National Honor Society in Psychology, will sponsor a tour of the psychology laboratories on Saturday, April 26. A tour of the clinical, cognitive, developmental, neuro-science, perception and animal laboratories is planned. The tour will include explanations, demonstrations, and discussions regarding the variety of research being conducted in the Psychology Department. The laboratories will be open from 10:00 a.m. to 5:00 p.m. on Saturday. Tours will begin on the hour at 10:00 a.m., 1:00 and 3:00 p.m. Enter University Hall from the south side using the second door from the southeast corner of the building. Further directions will be available at the Registration Area.

9:00 A.M. Tour and Open House of Geology Department and Geology Museum

The departmental museum, located in Room 3049, Bowman Oddy Laboratories (BOL), offers educational and reference displays of minerals and fossils from both the local area and continent-wide and will be open from 9:00 A.M. - 5:00 P.M. Saturday. Sixty minute guided tours will leave BOL 3049 at 10:00 a.m. and 2:00 p.m. Visitors will have an opportunity to view teaching and research facilities, including the Organic Carbon Facility and Subsurface Data Center. The Organic Carbon Facility contains modern coal characterization equipment and reference samples of Ohio coals. The Subsurface Data Center houses a research collection of rock cores, cuttings, lake sediments, and Lake Erie soft sediment cores. The Department's Gamma Eta Chapter of Sigma Gamma Epsilon will be serving coffee, hot tea, soft drinks, and donuts in BOL 3049.

1:00 P.M. Stranahan Arboretum

The University of Toledo's 47-acre Stranahan Arboretum will be open to visitors; members of the Arboretum Board will be available to answer questions. The Arboretum has two small ponds, a ten-acre old-growth woodlot, and the largest collection of ornamental woody plants in northwestern Ohio. Transportation will be by private car. The Arboretum is a ten minute drive northwest of the University. Proceed north on Secor Road to Central Avenue, west on Central to Talmadge, north on Talmadge to Sylvania Avenue and west on Sylvania 1.2 miles to Tantara Road on your right.

2:00 P.M. Ecology Keynote Lecture

A talk entitled, "Manned Submersible Research in Lake Superior," will be given by Dr. William Cooper of the Zoology Department of Michigan State University. The recent *expedition in Lake Superior with a manned submarine* will be discussed. Slides and color VCR movies of the deepwater fish, invertebrates and geology will be utilized. Future research dives will also be discussed. This lecture will be part of the Ecology Section's afternoon program and held in the same room. (Check program for Section R. location.)

2:00 P.M. Tour and Open House of Department of Physics and Astronomy Laboratories

The following laboratories will be open from 2:00 P.M. - 5:00 P.M. Saturday:

Atomic Physics/Heavy-Ion Accelerator Laboratory - (ES 1000)

Studies of atomic structure and atomic interactions through optical, uv and electron spectroscopic techniques are conducted.

Laser Non-Linear Spectroscopy Laboratory - (ES 1003)

Coherent excitation and emission in multi-level systems is studied.

Low Temperature Physics Laboratory - (ES 2022)

Studies of the properties of materials from near the absolute zero (.07K) to room temperature are carried out. Recent work concentrates on thermal properties of disordered materials, such as glass and glass ceramics.

Non-Linear Optics Laboratory - (ES 1001B)

Optical Harmonic Generation due to surface waves on metals is investigated.

1-meter Reflecting Telescope - (RO 5th floor)

The telescope is used in conjunction with a high-resolution echelle spectrograph to observe line profiles in binary stars or chromospherically active objects. The echelle spectrograph is coupled to the telescope focal plane by means of a fiber optic link.

The detector used is an intensified solid-state diode array, under control of a dedicated DEC minicomputer.

2:00 - 5:00 P.M. Open House at the Computer Aided Engineering, Design and Manufacturing Center (CAEDM)

The CAEDM Center, located in Room 1257 at the University Computing Center, will be open for tours and demonstrations. See state-of-the-art computer aided design facilities and learn how they are used in modern engineering and manufacturing applications.

SUNDAY, APRIL 27, 1986

9:00 A.M. Geology Field Trip

The annual Ohio Academy of Science geology field trip will leave parking lot #13, just north of the West Ramp and Bowman-Oddy Laboratories, at 9:00 a.m. on Sunday, April 27. Transporatation will be by departmental van and private cars. Individuals in private cars may follow the vans or meet at the ferry dock in Marblehead, Ohio (directions will be available on Saturday) for a 10:30 A. M. ferry departure. The trip will proceed to Kelley's Island for observation of glacial grooves, Indian petroglyphs and Devonian stratigraphy. We should return by 4:00 p.m. The fee for the field trip is $8.00 and a box lunch is available for $4.00. Further information may be obtained from Dr. Mark J. Camp, Bowman-Oddy Laboratories, (419) 537-2398.

9:00 A.M. Bus Tour of Selected Metropark and Other Natural Areas of Lucas County

The facilities of Wildwood Preserve, Secor and Oak Openings metroparks will be featured. Additionally, the tour will pass through the Irwin and Schwamberger Prairie natural areas. Specifically, the nature centers at Wildwood Preserve and Secor Park, the walking center at Oak Openings and a dunes area at Oak Openings will be visited. In the event that the spring season has progressed rapidly enough, a wildflower walk at Swan Creek metropark may be scheduled. The tour will be adjusted in this event. The tour will be limited to 20 persons and registration will be available on Friday, April 25 and Saturday, April 26 at the meeting registration desk. Travel will be by University bus and the tour will convene at the southwest entrance of the Bowman-Oddy Laboratory. Persons desiring additional information should contact Dr. Lloyd Jones of the Biology Department, The University of Toledo, (419) 537-4596.

9:00 A.M. Ottawa National Wildlife Refuge and Crane Creek State Park

This 10,000+ acre collection of wetlands along the Lake Erie shore is the site of high concentration of migrant water and land birds each spring. Thousands of ducks and geese, nesting bald eagles and great horned owls, hundreds of hurons and egrets, and numerous other bird species should be present. If the sun shines, uncommon reptiles, such as the fox snake and Blanding's turtle, can also be seen. Although no official trip is presently planned, meeting attendees should consider making a side-trip to this extraordinary refuge, which is located about 30 minutes drive east of the University; directions and further information will be available at the meeting registration desk.

SUMMARY OF SYMPOSIA

FRIDAY, APRIL 25, 1986

- Ohio-Based Information Organizations - Data Links with the World
See page 57.

- *Economics of Biotechnology*
See page 49.

SATURDAY, APRIL 26, 1986

- Neuroscience: Yesterday, Today and Tomorrow
See page 13.

- Biotechnology and Its Implications for Education
See page 28.

- Northern Ohio Archaeology
See page 31.

LOCAL ARRANGEMENTS

Local Section Hosts

Dr. Harold L. Allen, Chairman
Dean of the Graduate School

Dr. John S. Eck, Vice-Chairman
Associate Dean of the Graduate School
The University of Toledo

Section	Local Host	Department
A. Zoology	Dr. Clifford Smith	Biology
B. Plant Sciences	Dr. Lloyd Jones	Biology
C. Geology	Dr. Mark Camp	Geology
D. Medical Sciences	Dr. James McCorquodale	Biochemistry, MCO
E. Physics & Astronomy	Dr. John Simon	Physics & Astronomy
F. Geography	Dr. Byron Emory	Geography
G. Chemistry	Dr. Julian Davies	Chemistry
H. Science Education	Dr. Jerome DeBruin	Elementary and Early Childhood Education
I. Anthropology & Sociology	Dr. Elias Nigem	Sociology, Anthropology and Social Work
J. Conservation	Mr. John Kusnier	Biology
K. Genetics & Cell Biology	Dr. Louis Glatzer	Biology
L. Mathematics & Computer Science	Dr. Harvey Wolff	Mathematics
M. Psychology	Dr. Robert Haaf	Psychology
N. Junior Academy	Dr. John Schaff	Curriculum & Educational Technology
O. Engineering	Dr. Robert Bennett	Engineering Physics
P. Administrative Science & Planning	Dr. Thomas Sharkey	Management
Q. Economics	Dr. Frederick Tank	Economics
R. Ecology	Dr. Peter Fraleigh	Biology
S. Information & Library Sciences	Dr. Gloria Freimer	Library

Other Resource Personnel

Mrs. Jody Molnar Conference Coordinator	Continuing Education
Mr. Fred Mollenkopf	Public Information

OUR HOST

The University of Toledo, which observed its 100th anniversary in 1972, is one of the nation's outstanding urban universities. Its fall, 1985, headcount enrollment was 21,238. Of that total, 3,067 were enrolled in Graduate School and the College of Law. It had its origin in 1872 with the gift of 160 acres of farmland donated by Jesup W. Scott, a public spirited Toledo resident who felt that the city should have a university to train young people for responsible positions in the growing community. The original land endowment is now the site of UT's University Community and Technical College-the Scott Park campus. In 1884, the University became a municipal institution with the City of Toledo beginning a program of financial support which continued for 83 years, terminating upon the University's conversion to state status in 1967.

In its early years the Univesity held classes in various temporary locations. As reflected in its first name-Toledo University of Arts and Trades-courses were devoted to architecture, painting and manual training.

The first expansion came in 1904 when the University became affiliated with the Toledo Medical College and established a College of Pharmacy. Affiliation with the Toledo YMCA College of Law followed 1909. Other colleges - education, commerce and industrial science - were established within the next decade.

The University's greatest period of growth dates from 1928. The citizens of Toledo then voted a bond issue for the development of a modern new campus on suburban West Bancroft Street and the construction of the first two buildings, University Hall and the Field House. Occupied in 1931, the original campus has been expanded to more than 200 acres with 32 major collegiate structures. Located in one of Toledo's finest residential sections, it provides a suburban atmosphere, yet is an integral part of the civic, cultural and commercial life of the community.

Coincident with its Centennial Observance, the University completed the major elements of an extensive main campus capital improvements program. Completed in the '70s were a new College of Law Center and the William S. Carlson Library, second largest building on the main campus and named for the University's 10th president who served from 1958 until his retirement in October, 1972.

Among other recent campus additions are Centennial Hall, a multipurpose activities center seating nearly 9,000 for sports events, concerts and commencement; the Center for Performing Arts, which houses the music and theater departments; the Continuing Education Center; Centennial Mall, an attractive central campus commons; Bowman-Oddy Laboratories; the Parks Tower residence hall; a major addition to the Student Union; two parking ramps; Stranahan Hall, which houses the College of Business Administration, and an addition to the Engineering-Science Building. Scheduled for completion in 1987 is McMaster Hall, which will house the physics and astronomy department.

Opened in 1969, the Scott Park campus of the University Community and Technical College is located one and a half miles southeast of the main campus. It is comprised of six major classroom and laboratory structures on the site of the original Scott land endowment. A Student Center which provides extensive facilities for extracurricular and recreational activities was completed and opened in 1975.

Among other facilities, the University owns and maintains the R.A. Stranahan, Sr. Aboretum, a 47-acre site northwest of the main campus which was given to the University in 1964 in memory of the late Toledo industrialist and civic leader. The site includes two large ponds and serves as an outdoor laboratory for studies in botany, ecology, horticulture and pharmacology, as well as providing a haven for wildlife.

Dr. James D. McComas, who served as President of Mississippi State University for nine years, assumed the Presidency of The University of Toledo in July, 1985, and formally was inaugurated as UT's 12th president in ceremonies the following October.

The University is justifiably proud of its highly qualified faculty. Ninety-five percent have advanced degrees, with 73 percent holding an earned doctoral degree. Members of the faculty are active not only within the University setting, but also are involved with community programs, research projects and the publication of professional articles and textbooks. A most significant quality of the University faculty is its interest in students and its commitment to providing the best possible learning experience and environment.

A university is more than just a campus - it is people. Faculty members of The University of Toledo realize this and extend their efforts beyond the typical classroom setting to be available to students and respond to their individual needs. This is more than a philosophical objective, it tends to be a way of life at The University of Toledo.

The University of Toledo long has benefited from close ties with the urban community. Toledo, the nation's 40th largest city, is the trading center for 14 counties in northwestern Ohio and southeastern Michigan. The population of the industrial and agriculturally rich trading area is more than 1.2 million persons. Approximately 470,000 reside in Lucas County, of which Toledo (346,000) is the seat of government.

Located at the western tip of Lake Erie, the Port of Toledo (23rd largest in the U.S.) ships grain, coal, iron ore and general cargo. About 2,000 vessels, many of them from foreign ports, visit the harbor during the annual Great Lakes-St. Lawrence Seaway navigation season. The lake and nearby waterways provide excellent facilities for fishing, boating, water skiing, ice skating and other sports. An extensive renovation of the downtown has been underway several years and is continuing with construction of a convocation-convention center complex. The University will operate the $10 million state-funded convocation center portion. The Portside Festival Marketplace is another downtown attraction for visitors with its dozens of shops and restaurants.

Known as the "Glass Capital of the World" and the home of world-famous "Jeep" vehicles, Toledo has more than 1,200 manufacturing plants. Their products include automobile parts and accessories, stamping, die castings, chemicals, and spray equipment. The city is one of the nation's principal railroad centers and its two oil refineries make Toledo the largest refining center between Chicago and the eastern seaboard. Toledo is served by several major airlines through Toledo Express Airport, operated by the Toledo-Lucas County Port Authority.

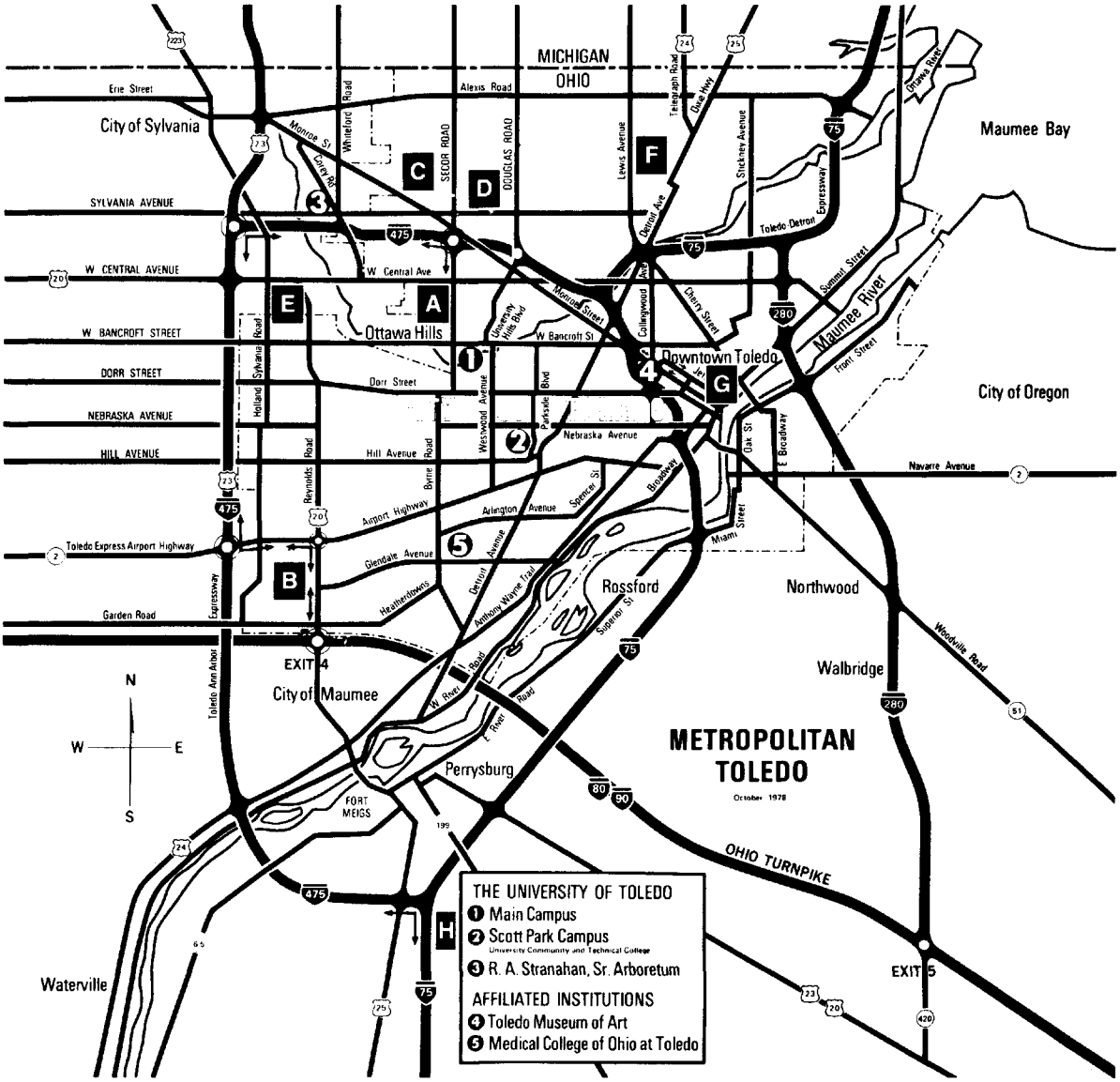
The city has a $90 million expressway system which is linked to the east-west Ohio Turnpike and the north-south I-75 which extends from northern Michigan to Florida.

Toledo's public schools, hospitals, libraries and parks are among the nation's finest, and the community provides a variety of cultural resources which complement academic life. The Toledo Museum of Art is one of the world's leading museums and its unique Peristyle is the scene of performances of the Toledo Symphony Orchestra, Toledo Choral Society and Concerts by visiting performing artists. The Toledo Zoo has a Museum of Health and Natural History, amphitheater, botanical center and large freshwater aquarium.

The University has seven colleges which award undergraduate degrees; advanced degrees are offered through the Graduate School and the College of Law. The undergraduate colleges are Arts and Science, Business Administration, Education and Allied Professions, Engineering, Pharmacy, University College which primarily is for students pursuing individualized programs, and the University Community and Technical College.

University Area Restaurant and Motel Guide

Published by The University of Toledo Office of Admissions



Toledo is proud of its many fine restaurants, which range from fast food to specialty cuisine. Many of these restaurants are located on Secor Road and Monroe Street (near The University) and on Reynolds Road (near Turnpike Exit 4). Listed here are but a few of the restaurants and motels which are convenient to our visitors. The Admissions staff will be pleased to help you select other accommodations, not included on this list, and provide directions.

TOLEDO AREA CODE (419)

Restaurants

A Secor Road-Westgate Shopping Center
- Friendly's Restaurant 3301 W. Central 537-8623
- Bassett's Health Foods 3301 W. Central 531-2911
- Ponderosa Steakhouse 3330 W. Central 536-6988
- The Original Pancake House 3310 W. Central 535-5927
- Pizza Hut 3425 Secor 536-3336
- McDonald's 3138 Secor 536-7661
- Wendy's 3455 Secor 537-9011
- Denny's 3302 Secor 531-1190
- China Gate 3316 Secor 531-2847

B Southwyck Mall/Reynolds Rd. Area
- Bombay Bicycle Club Cafe and Bar 1918 S. Reynolds 865-8048
- Dominic's Italian Cuisine 2121 S. Reynolds 381-0131
- Bob Evans Farm Restaurant 2141 S. Reynolds 381-1422
- Chuck Muers 1435 Baronial Plaza 866-8077
- Red Lobster Inn 1422 Reynolds 893-9494

C Monroe Street/Franklin Park Mall
- Willows 4844 Monroe 473-1276
- Red Lobster Inn 4990 Monroe 473-3135
- Pizza Hut 5590 Monroe 885-3565
- Bob Evans Farm Restaurant 4805 Monroe 475-2070

D Sylvania/Douglas
- Friendly's Restaurant 2516 W. Sylvania 472-7402
- Timko's Soup 'N Such W. Sylvania at Douglas 475-4629

E North Reynolds
- The Oaken Bucket 2841 N. Reynolds 531-5412

F North Toledo
- Mancy's 953 Philips 476-4154

G Downtown
- Boody House Restaurant 152 N. Summit 241-3322
- Old Spaghetti Warehouse 42 S. Superior 255-5038
- Ricardo's One Seagate (O-I Bldg lower level) 255-1116

Motels/Hotels

A Secor Road-Westgate Shopping Center
- Sheraton Westgate 3536 Secor 535-7070

B Reynolds Rd.-Southwyck Mall Area
- Ramada Inn 2340 S. Reynolds 865-1361
- Holiday Inn 2429 S. Reynolds 381-8765
- Red Roof Inn 1570 Reynolds 893-0292

H Perrysburg/I-75
- Holiday Inn 106030 Fremont Pike 874-3111
- Days Inn Motel 10667 Fremont Pike 874-8771

ADM 218 484 15C

SECTION A. ZOOLOGY
MORNING SESSION - BOWMAN ODDY 2049
SATURDAY, APRIL 26, 1986
C. LAWRENCE COOPER, PRESIDING

9:00 OHIO CRAYFISHES (DECAPODA:CAMBARIDAE) THAT MAY BE THREATENED SPECIES. Raymond F. Jezerinac, Department of Zoology, The Ohio State University, University Drive, Newark, Ohio 45055.

Intensive field work during the past five years indicates that the Allegheny Crayfish [Orconectes obscurus (Hagen)] is not an endangered species. The introduction of the Rusty Crayfish [O. rusticus (Girard)] into Sunfish Creek, however, has almost eliminated the Allegheny Crayfish from this watershed. Additional information is needed to determine the status of the following taxons. The Fantail Crayfish [O. virilis (Hagen)] occurs only in the East Branch of the Chagrin River. This stream should be re-investigated to determine if the Rusty Crayfish is eliminating the Fantail Crayfish. The Great Lakes Crayfish [O. propinquus (Girard)] apparently has been extirpated from the Maumee, Portage, Sandusky, and Rocky rivers. The status of this species in the Grand and Ashtabula rivers and Conneaut Creek is unknown. Orconectes sanbornii erismorphorous Hobbs & Fitzpatrick has been collected from only one locality in the lower Scioto River basin. The Cincinnati Crayfish [O. sloanii Bundy] has disappeared from a number of localities where it was formerly collected. The taxonomic status and distribution of what has been called O. juvenilis (Hagen) in Ohio needs special attention. This taxon is either O. spinosus (Bundy) or a closely related undescribed species that has been collected, usually in small numbers, from the Little Miami, lower Scioto River, and Eagle and Pine Creeks in southern Ohio.

9:15 NEW DISTRIBUTIONAL RECORDS OF CAMBARUS (JUGICAMBARUS) MONONGALENSIS ORTMANN AND C. (J.) DUBIUS FAXON (DECAPODA:CAMBARIDAE) FROM WEST VIRGINIA, WITH COMMENTS ON THEIR TAXONOMIC STATUS. G. Whitney Stocker, 13773 Bodle Road, Newark, Ohio 43055 and Raymond F. Jezerinac, Department of Zoology, The Ohio State University, University Drive, Newark, Ohio, 43055.

A survey of the crayfishes of West Virginia belonging to the subgenus Jugicambarus was started in 1984. Thus far, 25 collections have been made. Cambarus (J.) monongalensis, a primary burrower, was collected on the Allegheny Plateau north of the Little Kanawha River from Hancock (2 collections), Brook (1), Marshall (3), Wetzel (1), Tyler (1), and Gilmer (1) counties. A closely related but undescribed species, which is a secondary burrower, inhabits the Allegheny Mountains and was captured from Randolph (1), Grant (1), and Pocohontas (1) counties. Two rather distinct forms of C. (J.) dubius were noted. The "type" form, referring to the type locality, is a primary burrower and is most often orange in color. This form inhabits the Allegheny Mountains and a portion of the Allegheny Plateau and has been collected from Preston (2), Taylor (1), Tucker (2), Randolph (1), and Upshur (1) counties. The other form is a secondary burrower and varies in color but usually has a blue to black body with orange to red on its' chelae. This latter form has been found only on the Allegheny Plateau and has been collected from the New - Kanawha, Guyandot, and Big Sandy river drainages in Lincoln (1), Wayne (2), McDowell (1), Webster (1), and Wyoming (1) counties.

9:30 EVOLUTIONARY RELATIONSHIPS AMONG EASTERN NORTH AMERICAN CYPRINIDS.
MILES M. COBURN and Ted M. Cavender, John Carroll University, Cleveland, OH 44118 and Ohio State Univ. Columbus, OH 43210.

The interrelationships of North American cyprinids are so poorly known that a general classification has never been attempted. However several genera can be linked by derived character states of the skeletal system. In one group of taxa including Campostoma, Dionda, Macrhybopsis (storeriana, aestivalis, gelida, meeki), Erimystax (dissimilis, cahni, x-punctata and insignis), Phenacobius and Exoglossum the faciojugular foramen in the prootic is divided by a wide external bony bridge (absent in D. episcopa, D. diaboli Exoglossum and half the specimens of Phenacobius); the maxilla has a single large condyle and the tubercles for the palatal ligament and tendon of the adductor mandibulae are enlarged; and the supratemporal canal medially leaves the parietal and rests on the supraoccipital (but not in Exoglossum or most Campostoma. In addition have a dorsally oriented opercular arm (shared with Nocomis) and the mesial border of the metapterygoid is produced into a process that is the insertion for a large parasphenoid-metapterygoid ligament (shared with Rhinichthys).

In Campostoma and Dionda the face of the maxilla is eroded in a serrate pattern; a foramen pierces the frontal at the anterior end of the dilator fossa; The mesocoracoid strut is enlarged; and the pharyngeal pad is ovate.

9:45 EVOLUTIONARY RELATIONSHIPS AMONG EASTERN NORTH AMERICAN CYPRINIDS. PART II.
MILES M. COBURN and Ted M. Cavender, John Carroll University, Cleveland, OH 44118, and Ohio State Univ., Columbus, OH 43210.

Several eastern North American cyprinid genera can be defined on the basis of derived character states of the skeletal system. Species of Macrhybopsis (storeriana, meeki gelida and aestivalis) share an enlarged supraethmoid, a urohyal with an eroded ventral margin and serrated vertical lamina, a short triangular basihyal, a dorsal metapterygoid prong, elongated BSR and a posterior placement of the jaw articulation. The parasphenoid shaft has a straight, rather than recurved, profile in Macrhybopsis and Erimystax.

Phenacobius and Exoglossum share small, delicate pharyngeal arches and pad, greatly elevated dorsal border of the anguloarticular, enlarged socket and tubercle on the maxilla for the adductor mandibulae insertion, expanded ascending palatal process, ventrally displaced preopercular canal, divided hyomandibular foramen, urohyal with short mesially touching arms, an enlarged 4th Weberian rib, and a fusion between the 2nd and 3rd Weberian vertebrae in about 50% of the specimens examined. All species of Phenacobius lack a mandibular canal.

10:00 CLADISTIC ANALYSIS OF EASTERN NORTH AMERICAN CYPRINIDAE. Ted M. Cavender and Miles M. Coburn. Ohio State University, Columbus, OH, 43210 and John Carroll University, Cleveland, OH, 44118.
Part I
Four genera (Codoma, Pimephales, Opsopoeodus and Cyprinella share a derived character state in the expansion of the first pleural rib at its proximal end. This rib was found to possess greater mobility than in its primitive condition Pimephales, Opsopoeodus and Cyprinella are grouped by the ossified extensions from the fifth vertebrae ventrally along each side of the systemic aorta. Pimephales, Opsopoeodus and Cyprinella share a bony enclosure of the optic foramen formed by medial extensions of the pterosphenoids. Pimephales and Opsopoeodus possess modified mandibles that have a shortened gnathic ramis of the dentary and an abbreviated anguloarticular. The supraethmoid is narrowed posteriorly and the ossified tubes of the cephalic sensory canals are often separated from the supporting bones. Many spawning male members of the genus Cyprinella have the anterior pleural ribs enlarged and twisted in the area of attachment of the intercostal liguments. Also better developed in mature males are the specialized ossifications of the fifth and sixth vertebrae. Members of this genus typically have the neural and hemal spines of preural vertebrae 2 - 6 expanded in the sagittal plane.

10:15 CLADISTIC ANALYSIS OF EASTERN NORTH AMERICAN CYPRINIDAE. Ted M. Cavender and Miles M. Coburn. Ohio State University, Columbus, OH, 43210 and John Carroll University, Cleveland, OH, 44118.
Part II
The taxa discussed in Part I are members of a larger group of sixteen eastern North American cyprinid genera that are interralated by common ancestry. Distribution of the following character states is critical to the construction of a hypothesis of relationships involving these genera: 1) a slit-like opening in the basioccipital 2) a shortened posterior neurocranium in conjunction with an elongated ethmoic region 3) often an enlargement of the orbit 4) major tooth row of the pharyngeal arch reduced to 4 teeth and the minor row to 1 or 0 5) hypohyal foramen at least partly incorporated into the anterior end of ceratohyal 6) posterior ventral border of the urohyal truncated or convex 7) ascending wings of the parasphenoid vertically or posteriorly directed 8) shortened mandibular canal 9) separate foramen in the prootic for the hyomandibular trunk of the facial nerve 10) reduced head on the first pleural rib. The interrelated genera are: Campostoma, Cyprinella, Dionda, Ericymba, Erimystax, Exoglossum, Hybognathus, Hybopsis, Macrhybopsis, Nocomis, Notropis, Opsopoeodus, Phenacobius, Pimephales, Platygobio and Rhinichthys.

10:30 ABUNDANCE AND DISTRIBUTION OF THE AMERICAN BROOK LAMPREY IN NORTHEASTERN OHIO TRIBUTARIES OF LAKE ERIE. Thomas Rosegger and Andrew White, Biology Department, John Carroll University, Cleveland, Ohio 44118.

The abundance and distribution of the ammocoete stage of the American Brook Lamprey, Lampetra appendix, was investigated in Lake Erie tributary streams in Lake, Geauga and Ashtabula counties of Ohio. Populations were discovered in many areas where the species was previously unreported, including several Order II and III tributaries which drain directly into Lake Erie. Ammocoetes were anesthetized with MS-222, dye-marked by injection and released after recovery. Ammocoete abundance was determined by standard Petersen mark-recapture techniques. Population estimates ranged from fewer than 25 per mile to more than 11,000. Largest populations were found in the smaller streams, especially tributaries of the East Branch Chagrin River, of the Grand River in SW Ashtabula county, and Lake Erie tributaries such as Wheeler Creek. This brook lamprey is currently protected as an Ohio endangered species but its great abundance and wide distribution in NE Ohio, the Mad River drainage of SW Ohio and in the Killbuck drainage of Wayne and Holmes counties suggest that the endangered status of this brook lamprey should be reconsidered.

10:45 CONTRIBUTION OF NATURAL MORTALITIES OF FISH TO APRIL-OCTOBER IMPINGEMENT AT A LAKE ERIE ELECTRIC GENERATING STATION. Andrew M. White, Biology Department, John Carroll University, Cleveland, Ohio, 44118.

Plant intake screens were washed twice per week, collecting all impinged fishes for a period of five hours. Fishes were immediately placed in containers of water and categorized as active, stressed, dead, or dead more than 5 hours. They were then examined to determine the probable cause of debilitation or death. Of the 34,108 fishes collected, more than 63% had been dead for more than 5 hours. Impingement could be attributed to factors other than plant operation in more than 82% of the remaining individuals. Without the October YOY shad (Dorosoma cepedianum) included, 12,160 fish were impinged. 67% of these were dead more than 5 hours and 85% of the remainder suffered from one or more factors which would result in death. More than 93% of the total impingement was related to death or impairment not associated with plant operation. Principal causes of impingement at this generating station were the natural fall die-off of YOY gizzard shad, hyperparasitism, starvation, sea lamprey attack, angler mortality, carcinomas, gill rot, fin rot, and/or infections of Aeromonas, Saprolegnia, or Columnaris.

SECTION A. ZOOLOGY
AFTERNOON SESSION - BOWMAN ODDY 2049
SATURDAY, APRIL 26, 1986
PAUL M. HOLESKI, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 HOST SPECIFICITY IN TANAORHAMPHUS LONGIROSTRIS. Jerry H. Hubschman, Biological Sciences, Wright State University, Dayton, Ohio, 45435.

Thirteen species of fish have been recorded as hosts for the acanthocephalan Tanaorhamphus longirostris (Van Cleave 1913). Of these, only two regularly contain mature worms. These are the gizzard shad Dorosoma cepedianum (LeSueur) and the threadfin shad D. petenense (Gunther). To date, only one species of intermediate host, the calanoid copepod Diaptomus pallidus Herrick, has been reported. In Caesar Creek Lake, Ohio, where the parasite is known to occur, of twenty-one species of planktonic crustaceans examined, only D. pallidus contains the cystacanth of T. longirostris. Comparison of geographic distributions, ecological, and behavioral factors suggests that this association (worm-copepod-shad) represents a relatively new or developing relationship that may not yet closely fit the classical requirements for strict host specificity.

2:15 CHARACTERIZATION OF THE DEVELOPMENTAL AEROBIC-ANAEROBIC TRANSITION IN ASCARIS SUUM. L.Vanover and P.R. Komuniecki, Dept. of Biology, University of Toledo, Toledo, OH 43606.

The parasitic pig nematode, Ascaris suum, displays a predominantly anaerobic metabolism as an adult, but an obligately aerobic metabolism as eggs and early larval stages (L1 and L2). In contrast to the typical aerobic end products produced by these early stages, adults excrete succinate and a mixture of reduced acids, including propionate, 2-methylbutyrate (2MB) and 2-methylvalerate (2MV), as end products of carbohydrate breakdown. In order to monitor this aerobic-anaerobic transition, L3 larvae have been cultured microaerophilically in vitro in RPMI-1640, pH 7.4 with 20 mM HEPES and 10% fetal calf serum at 37 C. Media has been removed daily and analyzed by gas-liquid chromatography to detect the presence of reduced end-products characteristic of adult A. suum. After 72 hours in culture, the L3 larvae undergo the last larval molt to the L4 stage, and this corresponds with the production of 2MB, 2MV, and propionate. 2MB and 2MV are present in a 1:1 ratio, while propionate concentration is approximately 2-fold higher. These results, together with preliminary observations on the effect of cyanide on larval growth, indicate for the first time that the L4 stage helminths have an anaerobic metabolism.

2:30 WHAT IMPACT DO PREDATORY PHANTOM MIDGE LARVAE HAVE ON WOODLAND MOSQUITO POPULATIONS?
Lee Mitchell, Toledo Area Sanitary District 5015 Stickney Avenue, Toledo, Ohio 43612

Field and laboratory experiments were conducted in order to learn more about the predatory nature of a common phantom midge, Mochlonyx cinctipes. In laboratory trials, mature Mochlonyx larvae consumed as many as 37 first- and second-instar mosquito larvae before pupation. An average of 2.8 mosquito larvae were consumed per day (range = 0 to 6). Small-scale field tests in an artificial container showed reductions in larval mosquito populations of 91% and 76% by Mochlonyx larvae after five days. Mochlonyx larvae were observed to readily attack and consume small, early-instar mosquito larvae, although larger prey were often killed but not consumed. Many Mochlonyx larvae did not successfully reach pupation during laboratory trials, indicating that dietary and/or other environmental requirements were not being satisfactorily met.

2:45 THE EFFECTS OF A NA-K CHLOROPHYLLIN ENRICHED DIET ON THE LONGEVITY OF DROSOPHILA MELANOGASTER. Dr. Lloyd G.K. Carr, Rio Grande College, Rio Grande, Ohio, and William R. Bahr, Southwestern High School, Patriot, Ohio, 45658.

This study was conducted to demonstrate the possible relationship that exists between the aging process and autoimmunological responses. Wild type Drosophila melanogaster were fed a Na-K chlorophyllin enriched diet. The adult life span was measured for the flies in three quantitatively enriched diet groups. A non-enriched diet group was maintained for a standard of comparison.

Data from the study revealed a maximum increase of 44.6% in the life span of those flies that were fed the enriched diet medium. Male flies showed a greater increase in life span as compared to the females.

The haemolymph of both treated and control flies was studied electrophoretically. The results revealed differences in the migration patterns of the protein fractions present in the haemolymph of the treated groups as compared to the control.

NOTE: Dr. Carr is deceased.

SECTION B. PLANT SCIENCES
FIRST MORNING SESSION - BOWMAN ODDY 2045
SATURDAY, APRIL 26, 1986
EMANUEL D. RUDOLPH, PRESIDING

9:00 BRUCE FINK, MIDWESTERN BOTANIST AND EDUCATOR, 1861-1927. Emanuel D. Rudolph, Department of Botany, Ohio State University, 1735 Neil Ave., Columbus, OH 43210.

Bruce Fink, for 21 years professor of botany at Miami University until his death at age 65, is a major figure in American lichenology. He early championed the, at first unpopular, proposal of Schwendener that lichens were dual organisms composed of fungi and algae. He devised and published a classification scheme which placed lichens among the fungi that he believed were parasitic on their algal component. Not only did he study lichen systematics and floristics, he was also concerned with their ecology and physiology. He espoused the anti-tobacco cause and published papers on the "tobacco habit." Fink's floristic studies are the ones for which he is now remembered, particularly his studies of Minnesota lichens and his lichen flora of the United States which was posthumously completed by his student Joyce Hedrick (Jones). The lichen flora, although difficult to use, is the only modern one for the United States that considers all lichen groups.

9:15 FIRST BIOLOGICAL SURVEY OF LAKE ERIE (1898-1901). Ronald L. Stuckey, Botany, The Ohio State University, 43210.

The first organized Biological Survey of Lake Erie was conceived in the 1890s by Dr. Jacob E. Reighard, Professor of Zoology, The University of Michigan. In 1898 he received liberal financial support from the U.S. Comission of Fish and Fisheries to conduct experimental investigations of the Lake's food species of fishes. Studies were needed on the entire chain of biological relationships of the organisms living in the shoreline marshes, tributary streams, and the Lake itself. The Survey, under Reighard's direction, was headquartered in the Federal Fish Hatchery at Put-In-Bay, now a research facility of the Franz Theodore Stone Laboratory. In addition to studies on selected species of fishes, a number of technical publications on vascular aquatic plants, algae, plankton, parasitic worms, and rotifers resulted. Some of the aquatic biological principles learned in the Survey were incorporated into an important text-book, Fresh-Water Biology (1918; 2nd. ed., 1959), compiled by H.B. Ward and G.C. Whipple, and widely used by North American students of fresh water biology and limnology. The main investigators were H.S. Jennings, A.J. Pieters, R.H. Pond, Julia W. Snow and H.B.Ward.

9:30 STATE ENDANGERED, THREATENED, AND PRESUMED EXTIRPATED PLANT RECORDS FROM A 3-TOWNSHIP AREA OF SOUTHERN OHIO: A LEGACY OF FLOYD BARTLEY. James F. Burns, ODNR, Division of Natural Areas and Preserves, Fountain Square, Columbus, OH 43224.

A great diversity of widely contrasting plant habitats exists within the 132 square mile area of Liberty and Jackson Townships, Jackson County and adjacent Jackson Township, Pike County, Ohio. This results in an extremely rich flora. The major plant collector in this area was the late Floyd Bartley. He collected thousands of plant specimens here, often with the late Leslie Pontius. Over 1100 taxa were collected by Bartley between 1928 and 1973 from Liberty Twp. alone. The Division of Natural Areas & Preserves has records of 71 state Endangered (E), Threatened (T), and Presumed Extirpated (X) plants collected in this 3-township area. This gives it one of the highest concentrations of rare plants in Ohio. Bartley collected 63 of these plants, 30 of which have not since been recollected here. 46 taxa were last collected after 1960. 35 taxa have been updated since 1979 by Division staff, 26 in the past 2 field seasons. Four E and 3 X taxa, e.g. Magnolia macrophylla and Gymnopogon ambiguus, are recorded for Ohio only from this area. It also contains the sites for the only current (post-1960) records for indigenous populations of 4 other E taxa, e.g. Eupatorium hyssopifolium. Several T taxa, e.g. Silene rotundifolia, reach their highest frequencies in the state within this area.

9:45 BREAK

10:00 RECENT DISCOVERIES TO THE FLORA OF OHIO. Jeff Knoop, The Nature Conservancy, 1504 W. First Avenue, Columbus, Ohio 43212.

During the 1985 field season three state endangered species and one state presumed extirpated species were collected at three new Ohio sites. Two of the three endangered species, Trillium recurvatum and Corallorhiza Wisteriana were found together on a wooded hillside in extreme western Hamilton County. Trillium recurvatum is now represented by three extant Ohio populations. The Corallorhiza collection is expecially noteworthy because, although historically collected from 11 Ohio counties, this is the first Ohio collection since 1974. Corallorhiza trifida was discovered in a small bog depression in central Geauga County. This species is now represented by two Ohio locations and was historically collected from four Ohio counties. A large population of the state extirpated Tomanthera auriculata was discovered in several small cedar glades (prairies) in southern Adams County, Ohio. This species was last collected in Ohio during 1951 and was historically known from only four Ohio counties. The rarity of this striking species throughout its range has prompted the U.S. Fish and Wildlife Service to propose a federal listing for the species. Upon discovery of these four species the private landowners of each site were informed about the importance of the areas. Each have subsequently agreed to voluntarily protect these species through the Ohio Natural Areas Registry Program.

10:15 MONITORING GENTIANA SAPONARIA L. (GENTIANACEAE), AN ENDANGERED SPECIES IN OHIO. Jennifer L. Windus, ODNR, Division of Natural Areas and Preserves, Fountain Square, Columbus, Ohio 43224

Gentiana saponaria, a herbaceous perennial, is widespread throughout the southeastern United States and northward to the southern Great Lakes. It is a gentian of moist thickets and wet open sites. In Ohio, the only extant records of this species are from the Whitehouse quadrangle in Lucas County. The largest known population, ca. 700 plants at Lou Campbell State Nature Preserve, is being monitored to learn more about its life history and implications for management. At Campbell Preserve, the gentians occur in a wet sedge meadow interspersed with Alnus rugosa. Baseline demographic data has been collected for 1984 and 1985. Information such as numbers of vegetative plants, flowers per plant, plants grazed, functional seed capsules, and insect-damaged seed capsules was recorded for all plants of the population. During the course of this study, it was discovered that only 8% of all seed capsules successfully disperse seed. Approximately 92% of all seed capsules are so severely damaged by the seed predation activity of the moth larva, Endothenia hebesana (Walker) that the seed dispersal mechanism is disfunctional and most of the seed is destroyed.

10:30 VARIATION AMONG FROELICHIA FLORIDANA (NUTT.) MOQ. PLANTS GROWN FROM SEED COLLECTED FROM 2 SEPARATE SITES DURING 2 CONSECUTIVE YEARS. Marilyn Ortt, 701 Colegate, Marietta, OH 45750

The Ohio populations of Froelichia floridana, listed as endangered by Ohio Div. of Natural Areas and Preserves, are disjunct by several hundred miles from other known populations. The species is known only from 5 small disturbed sites on sandy soils formed by glacial outwash within ca. 130 ha on a high Ohio River terrace in Washington Co. The extant sites may be fragments of a larger continuous population which have been isolated in varying degree by topographic and man-made features for an unknown length of time. Seeds of Froelichia were collected in 1983 and 1984 from 2 sites that seemed under imminent threat of development. The seeds were sown in plots on a strip of the same soil series in the Marietta Nursery of the Division of Forestry. After site preparation, planting variables consisted of removal vs. non-removal of leaf litter; placement of seed on the surface vs. a light raking; and time of planting. Plant density was measured within a 1 m^2 area for each plot as well as plant height, number and length of leaves, and the number of seeds produced by 10 randomly selected plants within each plot. Preliminary results indicate a wide variation of plant-form, leaf surface and seed production both within and among plots. A report will be made on the analysis of the effect of the planting variables and their interactions as well as an evaluation of differences between seed years and seed sources.

10:45 POLYGONUM PERFOLIATUM L. (POLYGONACEAE): A DANGEROUS NEW WEED IN THE OHIO RIVER VALLEY. Allison W. Cusick, Div. of Natural Areas & Preserves, ODNR, Fountain Sq., Columbus, OH 43224.

Polygonum perfoliatum L. is a rambling, perennial vine in the section Echinocaulon. The wiry stems are armed with recurved prickles. The plants form tangled mats over shrubbery and climb several meters into trees, shading out herbaceous and woody vegetation beneath. The large, blue,

berry-like fruits are dispersed by water and, possibly, by birds. This species is a serious agricultural pest throughout eastern Asia. In North America, Polygonum perfoliatum first was collected in the mid 1930's in York, PA. It now is well-established in riverine habitats in the Potomac and Susquehanna drainages in Maryland and the District of Columbia. Polygonum perfoliatum also grows in the Ohio River valley in Wood Co., WV, north of Parkersburg. This is the first report of this species from the Mississippi drainage. It is locally abundant along a 3 km stretch of the C&O Railroad and about gas wells on a high river terrace. So far, P. perfoliatum seems restricted to this single population in the Ohio River valley. However, this noxious pest likely will spread elsewhere unless a concerted effort is made to eradicate it. Polygonum perfoliatum has the potential to become one of the most obnoxious weed species in our flora.

SECTION B. PLANT SCIENCES
SECOND MORNING SESSION - BOWMAN ODDY 2047
SATURDAY, APRIL 26, 1986
LAWRENCE A. KAPUSTKA, PRESIDING

9:00 RESORPTION OF NUTRIENTS PRIOR TO LEAF FALL: ROLES OF PLANT GROWTH FORM AND SOIL NUTRIENT AVAILABILITY. R.E.J. Boerner, James G. Kooser and John C. Peterson. Department of Botany, Graduate Program in Environmental Biology & Department of Horticulture, The Ohio State University, Columbus, Ohio 43210

Resorption of nutrients prior to leaf fall is a major mechanism for nutrient conservation in woody plants. Resorption of nitrogen and phosphorus by trees generally decreases with increasing soil availability, though the relationship is stronger for P than N. In contrast, limited data suggest that perennial herbs resorb more N and P on more fertile soils. To clarify this, proportional and absolute N and P resorption were measured over three years in seven tree species, one shrub, and three perennial forest herbs along a gradient of soil nutrient availability in central Ohio. Woody plants consistently resorbed higher proportions of N and P than herbs. Within each growth form, some species exhibited strong nutrient availability/resorption relationships whereas others showed no consistent pattern of resorption. Where significant resorption/availability correlations existed, they were negative for woody plants and positive for herbs. Alternative schemes for energy allocation, nutrient conservation, and resource availability for woody and herbaceous perennial growth forms are proposed.

9:15 STRUCTURE AND COMPOSITION OF THE GOLL WOODS STATE NATURE PRESERVE, FULTON COUNTY, OHIO. Do-Soon Cho and R.E.J. Boerner, Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Species composition, size-frequency distributions and successional relationships were studied in Goll Woods, the last uncut remnant of the Black Swamp forest of northwestern Ohio. 37 tree species were identified within the preserve. Relatively well drained former beach ridges were dominated by sugar maple (Acer saccharum) and beech (Fagus grandifolia), with sycamore (Platanus occidentalis) and white oak (Quercus alba) also common; poorly drained flats were occupied by silver maple (A. saccharinum), American elm (Ulmus americana), bur oak (Q. macrocarpa), and ashes (Fraxinus spp.). Basswood (Tilia americana), ironwood (Carpinus caroliniana), red oak (Q. rubra) and red maple (A. rubrum) formed a transitional forest type between the two extremes. The presence of individuals of bur oak, sycamore, chinquapin oak (Q. muehlenbergii) and cottonwood (Populus deltoides) over 1m diameter is a unique feature of Goll Woods. In contrast to sugar maple and beech, which show typical reverse J-shaped size-frequency distributions, those "big tree" species are represented by only a few very large trees. A Markov Chain successional model suggests that, in the absence of major disturbance, sugar maple and beech will become more abundant while the oaks and other "big tree" species will decline.

9:30 CHEMICAL AND PHYSICAL CHARACTERISTICS OF SIX NORTHEASTERN OHIO PEATLANDS. Barbara K. Andreas and Gary R. Bryan. Department of Biology, Cuyahoga Community College, 2450 Richmond Rd., Cleveland, Ohio 44122.

Chemical and physical characteristics were examined in water samples taken from May - September in six northeastern Ohio peatlands. Physical characteristics examined included pH, temperature and conductivity. Chemical characteristics examined included calcium, magnesium, alkalinity, EDTA hardness, total phosphorus, ammonium-nitrogen and chlorides. Samples were taken from areas of open water and from the Sphagnum substrate.

Peatlands included in this study were chosen on the basis of their floristic composition which at first may appear to be similar. Upon examining water chemistry parameters from the study areas, the six peatlands may be separated into three classes. Triangle Lake Bog (pH 3.5 - 4.2) and Flatiron Lake Bog (pH 3.5 - 4.7) are classified as semi-ombrotrophic peatlands; Fern Lake Bog (pH 3.8 - 6.5) and Browns Lake Bog (pH 4.1 - 4.6), as weakly minerotrophic peatlands; and Herrick Fen (pH 7.0 - 7.6) and Jackson Bog (pH 7.3 - 7.7), as strongly minerotrophic peatlands.

9:45 BREAK

10:00 EFFECTS OF MYCORRHIZAE AND BELOWGROUND COMPETITION ON GROWTH OF RAGWEED(Ambrosia artemisiifolia). Hugh Crowell and Ralph E.J.Boerner, Department of Botany, Ohio State U., Columbus, Ohio, 43210.

Previous studies indicate that plants vary in the degree of their dependence on vesicular-arbuscular mycorrhizae (VAM), and that species in the nonmycorrhizal family Cruciferae may allelopathically inhibit VAM in neighboring plants. We sought to determine for ragweed(Compositae:mycorrhizal) 1) the extent and nature of its dependence on VAM, 2)the nature of belowground intraspecific competition, and 3)the nature of belowground interspecific competition with Brassica nigra (Cruciferae:nonmycorrhizal). Single ragweed 'targets' were grown in sand culture with and without VAM inoculum, and at high and low phosphorus(P) supply rates. Pots with targets also contained 0,2,4,8,12,or 16 B. nigra 'neighbors',or 3-5 ragweed neighbors. Neighbors were tied back from targets to eliminate aboveground competition. In the absence of any competition, mycorrhizal ragweed had greater shoot and total mass, greater total P in shoots and whole plants, greater plant P concentration, greater P uptake efficiency, and greater total rootlength than nonmycorrhizal ragweed. In the presence of belowground competition, target mass and target total P were generally significantly inversely correlated with neighbor root mass, regardless of the species of the competitor. These results suggest 1)that annual ragweed is obligately mycorrhizal, 2)that belowground competition can strongly affect ragweed growth, and 3)that allelopathy is not an important competitive mechanism in this system.

10:15 PATTERNS OF BIOMASS ALLOCATION IN LYCOPUS AMERICANUS AND L. UNIFLORUS (LAMIACEAE). Lucy E. Tyrrell. Department of Botany, The Ohio State University, Columbus, Ohio 43210.

This study investigated interspecific and site-to-site differences in the patterns of biomass allocation in two species of Lycopus with different modes of vegetative propagation. Lycopus americanus Muhl. produces belowground "stolons", whereas L. uniflorus Michx. produces surface "runners" with attached tubers. Both species commonly co-occur in wetland areas. Individuals of both species were harvested from a marsh and a floodplain site in northern Michigan at three times during the 1985 growing season, in order to determine seasonal patterns of reproductive allocation. In both species, flowering occurred earlier at the marsh site, and stolon and runner growth was initiated earlier at the floodplain site. Both species showed significant differences in both sexual reproductive effort (SRE) and vegetative reproductive effort (VRE) between the marsh and floodplain sites. For both species, final (i.e., September) SRE was greater at the marsh (16%) than at the floodplain (2-6%), whereas final VRE was greater at the floodplain (23%) than at the marsh (10%). Differences between species for final VRE were not significant at either site. L. americanus had a significantly higher SRE than L. uniflorus at the floodplain, but not at the marsh. Possible explanations for the large site-to-site differences in patterns of allocation will be presented.

10:30 DETERMINATION OF ALLELOPATHIC POTENTIAL IN HEMP DOGBANE (APOCYNUM CANNABINUM) AND HORSE NETTLE (SOLANUM CAROLINENSE). Mary K. Hafemann and Dr. Lloyd A. Jones
149 Troup Ave., Bowling Green, OH 43402

Changing tillage practices have led to an increased incidence of certain perennial weed species. Two of these weeds are hemp dogbane (Apocynum cannabinum L.) and horse nettle (Solanum carolinense L.). Severe infestations of these weeds have been observed, yet little is known of their allelopathic or competitive character. In our study

we attempted to determine whether their presence could result in growth inhibition of selected crop species due to allelopathic interactions. Our greenhouse experiments with cold-water extracts of the two weed species on corn (Zea mays L.), soybean (Glycine max L.), and sunflower (Helianthus annus L.) showed a selective inhibition of growth. The findings indicate that horse nettle significantly inhibited growth in corn and slightly inhibited growth in sunflower seedlings. The hemp dogbane appeared to have no effect on the crops tested. Based upon this work, yield reductions from these weeds could be attributed to allelopathic behavior, as well as competition.

SECTION B. PLANT SCIENCES
AFTERNOON SESSION - BOWMAN ODDY 2047
SATURDAY, APRIL 26, 1986
L. WALTER MACIOR, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 Ultrastructure and Cinephotomicroscopic Analysis of the Motile, Colonial Green Alga, Stephanosphaera. L.A.Wawrzyniak and G.L. Floyd, Department of Botany, Ohio State University, Columbus, 4321(

Stephanosphaera (Chlorophyta) is a matrix-surrounded, coenobic colony with parallel, biflagellate cells in a ring-like arrangement. Extensions of cytoplasm connect cells to the matrix envelope. Immature cells have the Chlamydomonas-like flagellar apparatus organization: basal bodies are in a V-shaped configuration, which, together with cruciately arranged microtubular rootlets, exhibit 180° rotational symmetry. During maturation of the flagellar apparatus, the basal bodies become laterally positioned, rotated, and separated. As a result, all four rootlets become ventrally oriented and nearly parallel, the distal fiber is lost, and the proximal fibers are partially detatched. Stephanosphaera has been considered by some authors to be closely allied to the unicell Haematococcus on the basis of similiar cytoplasmic extensions. Presence of the Chlamydomonas-type flagellar apparatus in Haematococcus and similarities in gametogenesis would support the probable relationship of Stephanosphaera to an Haematococcus-like ancestor. Cinephotomicrography was used to examine flagellar motion. Results will be compared with the motility of Chlamydomonas and other colonials. Flagellar beat patterns, and ultrastructural data will be used to show how flagellar apparatus configuration and colony organization contribute to colony motion.

2:15 POLLINATION ECOLOGY AND ENDEMISM OF PEDICULARIS HOWELLII. MACIOR, Lazarus Walter. Department of Biology, University of Akron, Akron, OH 44325

Pedicularis howellii is a root hemiparasite endemic to the Siskiyou Mountains of California-Oregon. Its flower is a pollen-vibration mechanism attracting 6 species of pollinating bumblebees by visible and ultraviolet light reflections. Analysis of corbicular pollen loads of pollinators indicated a low degree of foraging constancy but a high frequency of Bombus mixtus workers on the flowers. Pollinator behavior is similar to that of pollinators on other nectarless vibration mechanisms except that sternotribic stigmatic contact is coupled with upright foraging posture. No evidence was found to suggest that plant species blooming in the Pedicularis community and using the same pollinator species reflect phenological divergence of anthesis favoring lesser competition for pollinators. Pollinators within a community, however, did appear to favor certain combinations of plant species for their pollen and nectar resources. Pedicularis howellii's endemism appears to be defined by limited availability of natural and man-made breaks in the forest canopy along roads, trails, and meadows in a mixed conifer forest. This "edge effect" is also found in the endemic P. furbishiae and P. dudleyi. Obligately insect pollinated, P. howellii produces abundant seed and seedlings where soil stability and open habitat are available.

2:30 ORNITHOPHILY AMONG THE HAWAIIAN LOBELIOIDEAE (CAMPANULACEAE): EVIDENCE FROM NECTAR-SUGAR COMPOSITIONS. Thomas G. Lammers and C. Edward Freeman. Department of Botany, The Ohio State University, Columbus, OH 43210-1293, and Department of Biological Sciences, University of Texas, El Paso, TX 79968-0519.

Data on the sugar compositions of floral nectars were used to test the hypothesis that the Hawaiian Lobelioideae (Campanulaceae) were pollinated by nectarivorous passerines (Drepanididae and Meliphagidae) prior to the widespread extinctions of these endemic birds. If so, one would predict that the nectars would be hexose-dominant or hexose-rich. Nectars from 24 individuals, representing different taxa (3 genera, 10 species, and 3 interspecific hybrids), different conspecific populations, and different individuals within a population, were analyzed via high-performance liquid chromatography (HPLC). Mean fructose was 43.5% (range 37.6-48.0%), mean glucose was 54.5% (range 47.8-62.0%), and mean sucrose was 2.0% (range 0-4.7%). All samples were clearly hexose-dominant, with sucrose-hexose ratios less than 0.050 ($\bar{x}$=0.021), thus supporting the hypothesis of ornithophily among the Hawaiian lobelioids.

2:45 ANDROECIUM MIMICRY IN AUSTRALIAN THELYMITRA AND ELYTHERANTHERA (ORCHIDACEAE) FLOWERS. W. P. Stoutamire, Biology Department, University of Akron, Akron, Ohio 44325.

The orchid species Thelymitra crinita, Thelymitra fuscolutea and Elytheranthera emarginata are visited by small polylectic pollen-collecting bees in the genera Leioproctus, Lasioglossum, Exoneura and Nomia. Thelymitra species exhibit false pollen while Elytheranthera exhibits false anthers. No pollen is available as food for the visitors. The orchid flowers resemble flowers of unrelated plants visited by the same bees. The advertising of false pollen is one of several deceptive strategies utilized by orchid species in Australia.

3:00 HOMOPLASY WITHIN SIMSIA AND ITS RELATIVES AND THE IMPLICATIONS INTO THE SUBGENERIC CLASSIFICATION OF THE GENUS. David M. Spooner. Department of Botany, The Ohio State University, 1735 Neil Aveune, Columbus, Ohio, 43210.

Simsia (Compositae, Heliantheae) is a group of ca. 30 species of herbs and subshrubs distributed from the extreme southwestern United States to the center of Argentina. Some of the species are widespread roadside and agricultural weeds and others are narrowly restricted endemics. A number of characters unite Simsia to Tithonia, Helianthopsis, Helianthus, and Viguiera, and previous hypotheses have suggested relationships to the latter two genera. My previous work indicates a relationship to Viguiera series Grammatoglossae. An expanded investigation was conducted on the above four genera to characterize the generic substructure and more reliably polarize characters for an attempted cladistic analysis of Simsia. The results indicate that Viguiera probably represents a paraphyletic assemblage of taxa. Species of Simsia share similar phyllaries, ray and disc achenes, and the only character defining the genus is a unique disc achene. Extensive homoplasy within these four genera obviates a reliable polarization of cladistic characters and an unrooted network is judged to be the most reliable analysis of substructure within Simsia.

3:15 BREAK

3:30 A DEMOGRAPHIC AND PHENOLOGICAL STUDY OF SYNANDRA HISPIDULA (LABIATAE): A THREATENED OHIO SPECIES. Virginia Susan Moran. Department of Botany, Ohio University, Athens, Ohio 45701.

Synandra hispidula (Labiatae) is classified as "threatened" in Ohio (O.D.N.R. Division of Natural Areas and Preserves). This species was studied for two growing seasons in 1984 and 1985 near the Wildcat Hollow Backpacking Trail in the Wayne National Forest. In early spring, 1984, 55 rosettes were marked and observed of which 47 reached the fruiting stage. A total of 239 seedlings were marked and observed throughout their life cycle. In 1985, 142 of these reached the fruiting stage. A total of 172 seedlings were marked and observed until November, 1985, when the field research was completed. The average number of flowers and normally developed nutlets produced in 1984 were 12 and 36 respectively. The average number of flowers and nutlets produced in 1985 were 10 and 33 respectively. Single stemmed individuals were most common although plants were observed with up to eight stems which may compensate for the lack of vegetative reproduction in S. hispidula. Observed causes of damage to the plants, most likely contributing to their mortality were, deer grazing, deer and human trampling with severe damage inflicted by a Coleophoran larvae that devoured the embryo of developing nutlets during the fruiting stage. Snails are also persistent herbivores. Similar effects were observed in 1985 but the Coleophoran larvae was not found on a single plant.

3:45 GENETIC STRUCTURE IN A POPULATION OF TRILLIUM SESSILE (LILIACEAE). Richard Whitkus, F. A. Bryan, D. H. Les and L. E. Tyrrell. The Ohio State University, Department of Botany, Columbus, OH 43210.

Isozyme analysis was performed on a heterocyanic population of Trillium sessile L. to assess the underlying genetic structure. Individuals sampled were recorded for position in the population, flower color (red, intermediate, yellow) and age class (juvenile, adult). Of the 21 loci assayed by starch gel electrophoresis, three (6-GPD1, GOT1, GOT2) were polymorphic and formed the basis of further analysis. Analysis of within sample genotypic frequencies indicates the population is at Hardy-Weinburg equilibrium except for the GOT1 locus which shows a deficiency of heterozygotes. Between sample analysis of heterogeneity of gene frequencies again shows significant differences for the GOT1 locus. Significant differences for the other loci were dependent on the choice of samples. Position in the population and age class resulted in significant differences for 6-PGD1, while color class produced significant differences for all three loci. These data will be discussed in relation to various factors promoting substructure in the population.

4:00 GENETIC DIVERSITY IN THE GENUS PEDICULARIS. Bruce W. Robart, Department of Biology, University of Akron, Akron, Ohio 44325.

Zymograms were obtained from two species of Pedicularis by starch gel electrophoresis. Ten loci coding for six enzymes were resolved for P. canadensis and P. lanceolata. The number of alleles and their frequency was determined for each locus. Five loci were polymorphic in P. canadensis, but only one in P. lanceolata. Both species grow sympatrically in or around Stumpy Basin, a silted-in switching basin of the old Ohio Canal now forming a plant refuge. It is suggested that genetic drift due to the founder effect has caused the low variability in P. lanceolata. It is hypothesized that the low variability has been maintained through isolation as a result of the restricted habitat requirements of the species and the relatively recent establishment of the population. In contrast, P. canadensis is widespread in a continuous habitat adjacent to the basin, allowing for unrestricted gene flow to occur. It is also surmised that the P. canadensis population is much older, which has allowed time for mutations to occur and spread within the population.

4:15 FLAVONOID CHEMISTRY OF PEPEROMIA (PIPERACEAE) IN THE JUAN FERNANDEZ ISLANDS, CHILE. Hugo Valdebenito, The Ohio State University, Department of Botany, 1735 Neil Avenue, Columbus, OH. 43210.

Eight species and one variety of Peperomia are known in Chile, and four of these species occur in the Juan Fernandez Islands: Peperomia berteroana Miq., endemic on Masatierra and Masafuera; P. fernandeziana Miq. on both islands and Chilean mainland; P. margaritifera Bert. ex Hook. , endemic to Masatierra; and P. skottsbergii, endemic to Masafuera. Flavonoid analyses consisting of two-dimensional chromatographic profiles demonstrated that each of the species of Peperomia is characterized by a distinct array of flavonoids. A total of ten flavones was detected in the four species analyzed from 30 populations. Inter and intraspecific differences existed. Also, there were some variations in numbers of compounds within the same species (e.g. P. berteroana). In addition, P. skottsbergii and P. margaritifera were very similar in their profiles, and both species have more compounds in common with P. fernandeziana than with P. berteroana. It is suggested that P. fernandeziana in both islands might have had an introduction from conspecific mainland populations.

4:30 DISTRIBUTION PATTERNS AND LIFE HISTORY TRAITS OF FLOWERING DOGWOOD (Cornus florida L.) AT THE TAR HOLLOW STATE FOREST, OHIO. Francisco J. Artigas and Do-Soon Cho. Graduate Program in Environmental Biology and Department of Botany, The Ohio State University, Columbus, Ohio 43210.

The abundance and structure of two populations of flowering dogwood (Cornus florida L.) at the Tar Hollow State Forest was studied. The ridgetop site had high light levels, but low soil organic matter, acidic pH, and low soil water availability. At the valley site, nutrients and water availability were favorable for the growth of C. florida, but light level was reduced. The population size of C. florida was larger at the ridgetop site than at the valley site, especially in seedling and sapling size classes. However, sapling recruitment was lower at the ridgetop site. At the valley site, recruitment was higher, but seed production was much lower. Individuals at the ridgetop had lower growth rates, and the minimum diameter at which flowering occured was larger than at the valley site. This, together with low sapling recruitment, controls the abundance of C. florida at the ridgetop site. At the valley site, conditions were more favorable for growth, but seed production was low, presumably because of low light levels.

SECTION B. PLANT SCIENCES
POSTER SESSION - STUDENT UNION, INGMAN ROOM
SATURDAY, APRIL 26, 1986

Board A @ 9:00 AM THE DISTRIBUTION AND METABOLISM OF N6 BENZYLADENINE IN LIGHT REQUIRING LETTUCE SEEDLINGS.
Roger G. Seeber, Jr. and David F. Blaydes
Dept. of Biology, West Virginia University, P.O. Box 6057, Morgantown, WV 26505-6057

Cytokinins replace the light requirement for germination of Lactuca sativa, Grand Rapids, seeds (achenes). The metabolism of exogenous cytokinin has been reported by Miernyk and Blaydes (Physiologia Plantarum Vol 39) and Pietraface and Blaydes (Physiologia Plantarum Vol 53 and Plant and Cell Physiology Vol 23). In this study we have used N6 Benzyladenine (14C8) and have sampled the achenes at the following time periods (2,4,8,12,16,18,20,24,28,32, 36,40,44,& 48 hours). The seedlings were divided into root and shoot, frozen in liquid nitrogen, and were stored at -15 C until used. Extraction procedures similar to Pietraface and Blaydes (Physiologia Plantarum Vol 53), involving a methanol extraction with a subsequent butanol partitioning were used. Each extract was fractionated by HPLC on a Bondapak C18 column, using a 60/40 to 40/60 convex water to methanol ratio. The distribution of cytokinins and metabolites will be discussed.

Board B @ 9:00 AM A SEASONAL STUDY OF THE VEGETATIVE SHOOT APEX OF ARISAEMA ATRORUBENS. David J. Stroup* and John L. Frola, Department of Biology, University of Akron, Akron, OH 44325, *Clemson University, Clemson, SC 29631.

The structure of the shoot apex of Jack-in-the-Pulpit (Arisaema atrorubens) is described in terms of a cytohistological zonation superimposed on a tunica-corpus configuration. The tunica tends to be a single layer, while the corpus is indistinct because of gradual differentiation of pith cells.

Cytohistological zonation is interpreted in terms of a distal axial zone, the metrameristem; a peripheral zone, the flanking meristem; and a subterminal axial zone, the rib meristem.

The seasonal cycle resulted in no apparent changes in the structural aspects of the vegetative shoot apex.

Axillary buds are described as being initiated from detached meristems which show cytohistological zonation consisting of stratified initials, overlaying a group of subtending cells, the basal initials. A zonal pattern characteristic of mature vegetative shoot apices becomes evident in the axillary buds during the initiation of the first leaf primordium.

SECTION C. GEOLOGY
FIRST MORNING SESSION - BOWMAN ODDY 3045
SATURDAY, APRIL 26, 1986
JANE L. FORSYTH, PRESIDING

9:00 **BIPOLAR CONNECTIONS OF THE INSTITUTE OF POLAR STUDIES. R. P. Goldthwait, G. D. McKenzie, and P. J. Anderson. Institute of Polar Studies, The Ohio State University, Columbus, OH 43210**

Worldwide contact by the Institute has been established through cooperative research projects, publications, presentations at and hosting of international committee and scientific meetings, and exchange of graduate students and research scientists. The Institute, founded in 1960 following the International Geophysical Year, has concentrated its research in the fields of geology and glaciology; however, other disciplines represented include: agronomy, anthropology, botany, engineering, climatology, geophysics, history, meteorology, political science, photogrammetry, and zoology. Most research has been conducted in Antarctica; other areas of study include Greenland, Alaska, Scandinavia, Canada, New Zealand, Peru,

Australia, Patagonia, China, Africa, and India. Reports (85), contributions to scientific journals (550), and miscellaneous contributions (233) are the main products of the Institute. Publications are exchanged with 35 foreign institutions and mailed to individuals in more than 20 countries. The Institute has hosted international meetings with representatives from more than 15 countries. The exchange of scientists, most of whom have participated in Institute expeditions, has helped to develop an important bipolar network for continuing research. These worldwide connections with scientists and administrators are among the most important established by the Institute.

9:15 ELEMENTAL COMPOSITION OF TILLS IN THE CUYAHOGA VALLEY NATIONAL RECREATION AREA, NORTHEASTERN OHIO. Robert Katzmark and John P. Szabo. Geology Department, University of Akron, Akron, OH 44325

Inductively coupled plasma (ICP) analyses performed on 25 selected till samples of varying ages from the Cuyahoga Valley National Recreation Area in northeastern Ohio were analyzed statistically. Samples of the less than 74 micron fraction from the Lavery, Kent, Northampton and Mogadore Tills were analyzed for P, K, Ca, Mg, Mn, Fe, B, Cu, Zn, Al, and Na. Bivariate regressions show most elemental concentrations correlate to grain size. Statistical tests show some significant differences in elemental means among individual till units which are the result of variations in source area and local materials. The tills that are most similar in this study are the Kent and Mogadore Tills and the Lavery and Northampton Tills. The sandy Kent and Mogadore Tills have a similar northeastern source area which was low in overall carbonate content. The clay-rich Lavery and Northampton Tills have somewhat similar mineral contents suggesting a more northwesterly carbonate-rich source in the Erie Basin.

In addition Ca and Mg content determined by ICP analysis was compared to Ca and Mg content calculated from carbonate content derived from a Chittick apparatus. Ca has a strong correlation with carbonate content. Mg has a weaker correlation implying that some Mg originates in carbonates, but an additional source of Mg is chlorite.

9:30 A PLEISTOCENE STAG-MOOSE (CERVALCES SCOTTI) FROM LICKING COUNTY, OHIO. D.L. Dyer, Ohio Historical Society, Columbus 43211; C. R. Harington, National Museums of Canada, Ottawa K1A 0M8; R.L. Fernandez and M.C. Hansen, Ohio Department of Natural Resources, Division of Geological Survey, Columbus 43224.

Portions of a skeleton of an adult male stag-moose (Cervalces scotti) were salvaged from a pond excavation in Jersey Tp., Licking County, Ohio (Jersey 7½-minute quadrangle), in June 1985. This area, on the Johnstown Moraine, appears to represent an infilled kettle lake of Late Wisconsinan age in which a blue-gray lacustrine clay was succeeded by peat. The stratigraphic provenance of the skeletal elements is uncertain; however, radiocarbon dates of 11,500 ±130 B.P. on Cervalces bone and 11,710 ±110 B.P. from wood (Populus sp.) in the peat layer suggest that the skeletal elements of the stag-moose were derived from the peat.

Skeletal elements recovered include portions of the cranium, diagnostic antler beams, left mandible, left humerus, left radius, a thoracic vertebra, metacarpals, metatarsals, and phalanges. This specimen, which is one of the largest known, is only the second record of Cervalces scotti from Ohio.

9:45 INTERNATIONAL CLASSIFICATION OF GLACIAL FEATURES. Richard P. Goldthwait. P.O. Box 656, Anna Maria, FL 33501

During the past 13 years a morphological classification of glacigenic deposits has been nearly completed. Most of the compilation was completed here in Ohio; so Ohio had a major share of influence. This has been done for the International Quaternary Association by (1) Correspondence from 82 glacial geologists in 24 nations criticizing each latest version, and (2) by local small meetings in 12 countries discussing weak points and suggesting new ones. We added eroded features, for example. A first objective is the common understanding of terms used in glacial geology. This has necessitated a table of near-equivalents in 8 languages which is now undergoing final revision. The second objective is to associate features with common elements of origin, for example:(I) under moving basal ice, or (II) on top of, and within, stagnant ice usually near the glacier margin, and (III) proglacial, washed beyond the contemporaneous ice limit. Inevitably this led to three subdivisions under most categories, namely, (A) eroded bed rock, (B) the deposits dominatly composed of unsorted till, versus (C) those dominatly of washed and sorted gravel, sand or silt/clay. Items such as landslides, permafrost, or windblown loess are omitted.

10:00 GROUNDWATER ANALYSIS OF THE CEDAR BOG AREA, CHAMPAIGN COUNTY, OHIO. Mark Rickertsen Dept. of Geological Sciences Wright State Univ. Dayton, Ohio 45435

A study of the groundwater chemistry in the vicinity of Cedar Bog in central Ohio was conducted to determine whether recharge areas and flow patterns could be defined chemically. From water samples collected at several sites in five different geologic units, graphic plots of molar ratios indicate water from bedrock has consistant and distinct groupings when compared to water samples from outwash deposits. Some plots show ratios from bedrock similar to those in the local end moraine. Ratio plots of groundwater from Cedar Bog also show consistent groupings and a similarity in plot locations to two outwash deposits. Several plots show a trend of increasing molar concentration which is consistent with two possible flow paths toward Cedar Bog. A single source and flow path can not be recognized on the basis of molar ratios alone. Many factors control these ratios and in some cases, the range of values for the two outwashes overlap, making distinctions impossible. Utilization of a mass transfer model (Balance) in conjunction with a chemical equilibrium model (Wateqf) also indicate that the same two general flow paths can account for the resulting change in groundwater chemistry.

10:15 FOREST SOIL TOPOSEQUENCES AS INDICATORS OF HOLOCENE SLOPE PROCESSES IN WISCONSIN'S DRIFTLESS AREA. T. A. Frolking. Dept. of Geology & Geography, Denison Univ., Granville, OH 43023

Peoria loess distribution and forest soil properties on uplands, sideslopes, and footslopes indicate that hillslopes and their surficial deposits are largely relict of the periglacial environment of the late Wisconsinan. Loess thickness varies with upland width, segment angle, local relief, and slope aspect. On long slope segments, loess cover thins significantly through the 10 to 20% slope range and is usually < 50 cm thick on slopes > 20% and < 30 cm on slopes > 35%. Footslope morphology and stratigraphy indicate minimal erosion during the Holocene at most sites. Forest soils developed in loess (Typic Hapludalfs) are remarkably uniform on slopes ranging from 2 to 55%. On 102 slope transects, A and E horizons did not vary significantly with slope angle; Bt horizons showed slightly less development in terms of thickness, structure, and argillans on steep slopes. The Bt horizons of Fayette soils (> 120 cm loess) on steep slopes have higher pH's, slightly lower clay accumulations, and higher total phosphorus contents than on moderate slopes suggesting less profile leaching and some enrichment from throughflow. Tree canopies, porous litter layers, permeable A horizons, and high moisture holding capacities have minimized rainsplash and surface wash and maximized infiltration, thereby promoting slope stability and nearly uniform soil profile development across the upland landscape.

10:30 ON THE CAPTURABILITY OF PLANETOIDS BY EARTH-LIKE PLANETS. R. J. Malcuit, Dept. of Geology & Geography, Denison Univ., Granville, OH 43023

Although gravitational capture is one of the three classical hypotheses for the origin of the Earth's Moon, few calculations have been done to demonstrate its feasibility. The goal of this paper is to place some constraints on the physical properties of bodies that could be captured by Earth by tidal friction processes. Some simplifying assumptions for this problem are: (1) body density of encountering planetoids is 3.34 g/cm^3 (lunar density); (2) the bodies are characterized by a Displacement Love Number (h) = 0.6 (the approximate value of h for present Earth); (3) h for ancient Earth = 0.9; (4) the planetoids are captured into an orbit characterized by perigee = 20 R_e (Earth radii) and major axis = 290 R_e (near minimal conditions for stable gravitational capture); (5) the encounters between the bodies are near-grazing but non-collisional after tidal bulge geometry is considered, (6) the tidal deformation is along the line of centers of the bodies; and (7) the Energy Dissipation Factor (Q) for the calculations is 1 (i. e., all energy stored in the bodies during the encounter is dissipated). Under the above conditions, planetoids smaller than about 1000 km radius (0.6 lunar radius; 0.2 lunar mass,

can not be captured. The capture window widens considerably as the mass of the planetoid increases. Encounters of bodies of 2000 km radius (1.1 lunar radius; 1.5 lunar mass) result in dissipation of 2 times the energy necessary for capture, and larger bodies are even more capturable.

10:45 PHYSICAL GEOLOGY IN HIGH SCHOOL FOR COLLEGE CREDIT: THE ORRVILLE HIGH SCHOOL-COLLEGE OF WOOSTER CONNECTION. Bob Shonk, Orrville High School, Orrville, Ohio 44667 and F. W. Cropp, The College of Wooster, Wooster, Ohio 44691.

Ten Orrville High School seniors during two semesters of 1985-86 are completing a Physical Geology course at Orrville High School and will receive one course (four semester hours) of credit at The College of Wooster. Collaboration between the two authors enabled this unique program to be approved by Orrville City Schools and The College of Wooster. High school students chosen are honor students who follow the same general syllabus and use the same textbook (Strahler's Physical Geology) and laboratory manual (Hamblin and Howard). High school students complete more classroom hours and take more field trips than their college counterparts, who write more journal entries and are expected to spend more time studying outside of class. The same final examination is administered to both groups. Wooster High School will join the program next year.

SECTION C. GEOLOGY
SECOND MORNING SESSION - BOWMAN ODDY 3051
SATURDAY, APRIL 26, 1986
MICHAEL C. HANSEN, PRESIDING

9:00 STABILIZATION OF THE TIBBETS, SPAIT & SOL PAULIN MINES, MAHONING COUNTY, OHIO. Ann G. Harris, Youngstown State University, Department of Geology, 410 Wick Avenue, Youngstown, Ohio 44555

Three mines in Mahoning County were sealed off or stabilized during the summer of 1985. They were the Tibbets Mine in Austintown Township, the Spait & Sol Paulin in Beaver Township.

The Tibbits was a drift/slope entry that has been sealed off many years ago by pushing dirt into it and normal erosion had exposed it again. Since children were going into the mine and there was a shaft in the middle of the floor, the entry was sealed off with concrete.

The Spait opening was a debris filled air shaft. It was cleaned out, back-filled and sealed off with concrete.

The Sol Paulin was located at the Fonderlac Country Club, practice golf range. The entrance was in a ravine that had been filled in, however, the dirt being washed into the tunnel produced a large hole on the surface. The original tunnel was exposed by excavation and sealed off with concrete and then backfilled.

9:30 THE CONVERTABILITY OF OHIO COALS BASED UPON THEIR OPTICAL ANISOTROPISM. McMahon, David A. Geology Department, University of Toledo, Toledo, Ohio 43606.

The vitrinites of the Lower and Middle Kittanning, Pittsburgh and Clarion coals were measured for the % mean maximum ($\bar{R}_{max}$) and apparent % mean minimum reflectance values. These values according to Ting (1981), were used to calculate the bireflectance (R_{bi}) of the vitrinites of each coal. In addition, the R_{bi} was calculated as follows: $R_{bi}=3/2(\bar{R}_{max}-\bar{R}_{min})$.

Ting observed that optical anistoropy reflects the internal molecular structure and surface area of the coal and therefore can be used to assess the methane content and the convertibility of coal to a liquid or gaseous product. The Anistropic Ratio (R_r) was calculated as $\bar{R}_{bi}/R_{max}$. In 1985 Ting demonstrated that coals of Low anisotropic ratios yielded more adsorbed/absorbed hydrocarbons upon heating than those coal which exhibit a high (R_r) ratio.

Comparison of Ohio coals which exhibit high % conversion yielded R_r ratios which are similar to values recorded by Ting for good convertable coals. It is suggested, therefore, that this optical test could be used to estimate the relative convertability of other coals.

9:45 CHEMICAL METHODS OF ELIMINATING MINERAL MATTER AND ESPECIALLY SULFIDES FROM COAL. D. Dollimore, The Chemistry Department, The University of Toledo, Toledo, Ohio 43606.

The chemical extraction of mineral matter, particularly sulfides from coal is generally a costly business, both in the use of chemicals and in the operation of complicated techniques. It does not really make economic sense to burn the coal and an alternative usage may have to be sought to make a profit out of the resultant product. In considering the chemicals, two factors may reduce the costs. The first is the recovery of the chemicals. The second is to use chemicals which are themselves coal based.

Two possible systems are considered here - the first, a simple solvent extraction process - demonstrated by a series of laboratory experiments. This utilizes a highly polar solvent to dissolve out a large fraction of the coal. This can be progressively reprecipitated by the use of less polar solvents. The precipitated resins can be developed into high capacity activated carbon adsorbents. Alternatively, the original solvent extract can be hydrogenated and distilled to give a gasoline fraction.

A second system consists of reacting the carbonaceous material with potassium hydroxide, leaching out and recovering the KOH.

10:00 COMPUTER METHODS FOR THE PETROGRAPHIC PREDICTION OF THE COKING AND BLENDING POTENTIAL OF SELECTED OHIO COALS. Blessing, D. R., and Kneller, W. A., The University of Toledo, Toledo,Ohio 43606

A series of computer programs were developed to evaluate the potential use of Ohio coal reserves as components in coke blends. The programs are designed as a tool for establishing a coke quality from data derived from channel and core samples. Provisions are made to estimate the float/sink wash reductions for raw unwashed coal.

The U.S. Steel methods were followed for predicting the ASTM coke stability factor of individual coals and blends. The computerized series includes 4 blending programs which calculate blend compositions for two to five component blends, and assess each blend for optium coke strength and chemical quality. Sixty-two Ohio coals were selected from the principal coal producing seams in Ohio. These coals were blended with established coking coals. The data set consists of whole bed, bench and lithotopic samples. Various sample types were studied to determine the extent to which mining and preparation processes may be modified to extract a metallurgical grade product.

Preliminary investigation indicates that some of the Ohio coals which are poorly coking and high in sulfur and ash can be upgraded to meet coking quality criteria.

It was observed that Ohio coals are acceptable as blend components in formulating 5 to 10 percent of metallurgical coke blends.

SECTION C. GEOLOGY
FIRST AFTERNOON SESSION - BOWMAN ODDY 3045
SATURDAY, APRIL 26, 1986
MARK J. CAMP, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 BEDROCK GEOLOGIC MAP OF HAMILTON COUNTY, OHIO E. Mac Swinford, Ohio Department of Natural Resources, Division of Geological Survey, Fountain Square, Columbus, Ohio 43224

Amended Ohio House Bill 385 mandates the Ohio Department of Natural Resources, Division of Geological Survey to produce geologic maps for every county in the state. Field work for the production of a 1:62,500 scale bedrock geologic map of Hamilton County, Ohio has been completed as part of this statewide mapping program. The county map will be accompanied by columnar and cross sections and a brief explanatory text describing the rock units and any significant geologic findings.

The interbedded, fossiliferous limestones and calcareous shales of the Cincinnatian Series (Upper Ordovician) have been divided into seven formations based on field mapping at a scale of 1:24,000, measured sections, and core descriptions. Lithologic criteria used in defining the rocks include the ratio of limestone to shale and bedding style of the limestone and shale beds. In ascending order the units mapped are: the Point Pleasant tongue of the Clays Ferry Formation, the Kope Formation, the Fairview Formation, the Miamitown Shale (designated by a line because it is too thin to be mappable), the Grant Lake Limestone, the Arnheim For-

mation, and the Waynesville Formation. The rock units rise in elevation in a south-southeasterly direction because of flexure associated with the Cincinnati Arch. Parallel to this structural rise, the Miamitown Shale thins, the Fairview Formation thickens, and distinct intertongues between the Kope and Fairview Formations occur.

2:15 BEDROCK GEOLOGY OF CLERMONT COUNTY, OHIO Schumacher, Gregory A., Ohio Department of Natural Resources, Div. of Geological Survey Fountain Square, Bldg. B, Columbus, Ohio 43224

Field mapping for the production of a bedrock geologic map of Clermont County, Ohio has been completed. This map as mandated by Amended House Bill 385 is part of an ongoing project directed by the Ohio Division of Geological Survey to produce bedrock geologic maps for all Ohio counties.

Strata of the Cincinnatian Series (Upper Ordovician) are exposed throughout Clermont County. The stratigraphic units mapped in Clermont County are the Point Pleasant tongue of the Clays Ferry Formation, the Kope Formation, the Fairview Formation, the Miamitown Shale, the Grant Lake Limestone, the Arnheim Formation, and the Waynesville Formation. The Grant Lake Limestone was subdivided into 4 members: Bellevue Corryville, Mt. Auburn, and a currently unnamed member. Structure contours indicate a north-northwest plunge of the Cincinnati Arch at a rate of 10 to 20 feet per mile. Regional dip is east-northeast at 10 to 20 feet per mile. Formational contacts undulate throughout the county and form broad highs and lows. Northern Clermont County marks the transition area between the Mt. Auburn Member of Hamilton County, Ohio, and the unnamed member of Brown County, Ohio. The Miamitown Shale interfingers with the Fairview Formation and the Bellevue Member in western Clermont County. The lower Kope Formation exposed in southern Clermont County exhibits intervals with distinct increases in the percentage of limestone suggesting interfingering with the Clays Ferry Formation of Kentucky.

2:30 A BIOSTRATIGRAPHIC INVESTIGATION OF THE COLUMBUS LIMESTONE AT MARBLEHEAD, OHIO, Taylor, Amy E. and Camp, Mark J., Department of Geology, The University of Toledo, Toledo, Ohio 43606

The Middle Devonian Columbus Limestone crops out in a five to ten mile wide belt from south of Columbus, Ohio to Marblehead, Ohio, across Lake Erie and into Ontario. Five sections were collected in the western half of the quarried area between Lakeside and Marblehead. Fifteen microlithofacies were characterized through polished section and thin section study. The limestone varies from finely crystalline to very coarsely crystalline and usually exhibits an abundant fauna of rugosid and tabulate anthozoans; chonetid, strophomenid, and spiriferid brachiopods; and crinozoans. Lower microlithofacies are dolomitic, while upper units are virtually devoid of dolomite.

Sediments forming the Columbus Limestone appear to have been deposited in a shallow, continental shelf environment supporting a rich fauna and flora. A warm, normal marine, shallow sea covering the shelf was subjected to gentle wave agitation which kept the water well oxygenated. The source of clay and silica, which commonly has replaced the rugosid anthozoans, is probably terrestrial, resulting from periodic shoaling in the Cincinnati Arch area. Local structures such as this arch may be responsible for the alternating transgressive-regressive episodes indicated by the microlithofacies. The upward decreasing dolomite content supports an overall transgression of the Columbus Sea.

2:45 FACIES ANALYSIS OF THE DRILLER'S CLINTON IN NORTH CENTRAL OHIO. Zody, Steven P., & Noel, James A. Dept. of Geology, Ashland College, Ashland, OH 44805

In the main producing area, the driller's Clinton formation is believed by many geologists to be a delta distributary deposit. If this is so, to the west, the deltaic sandstone should change facies to a delta front shale.

Two east-west cross sections were constructed: a southern section from northwestern Wayne Co., through central Ashland Co. and into eastern Richland Co., and a northern section from southwestern Medina Co. through northern Ashland Co. Gamma ray/neutron, and gamma ray/density logs are used on the cross section. The lithologic units between the bottom of the Big Lime to the top of the Cincinnatian shales were correlated.

The sandstone facies grade into shale, in western Ashland Co. in the south and in central Ashland Co. in the north, thus indicating a northeast-southwesterly trending depositional strike, and the probable existence of delta front facies to the northwest.

3:00 MINERALOGY OF SEDIMENTS AND SOURCE MATERIALS IN OLD WOMAN CREEK ESTUARY, ERIE COUNTY, OHIO. Norman, Linda; Anderhalt, Robert; Frizado, Joseph; Rich, Charles C.; Mancuso, Christina; and Price, Pamela; Dept. of Geology, Bowling Green State University, Bowling Green, OH 43403

The Old Woman Creek estuary is a shallow body of freshwater that opens into Lake Erie, located 1 mile east of Huron, Ohio in Erie County. The mineralogy of the sediments in the estuary and of the rocks and sediments in the drainage basin were studied in order to determine which are the most significant sources of sediment to the estuary. There have been very few attempts to determine the provenance of sediments in modern muddy environments.

Possible source materials include: (1) glacial till, (2) glaciolacustrine sediment, (3) the Ohio Shale, (4) the Berea Sandstone, and (5) soils derived from the previously listed sources. Minerals found in these rocks and sediments are mica, illite, quartz, kaolinite, chlorite, K-feldspar, plagioclase, calcite, dolomite, siderite, and pyrite. Preliminary results of X-ray diffraction analyses of bulk samples suggest a relatively high 14 Å/7 Å ratio as a characteristic of glacial till, which indicates that it is a significant contributor to the estuarine sediments. Estuarine sediments contain almost no carbonate minerals, suggesting that these may be the least stable mineral group studied. K-feldspar to plagioclase ratios appear to be unaffected by weathering and transport, in that they are comparable to the ratios of the source material.

3:15 DEPOSITIONAL ENVIRONMENTS OF LUNGFISH BURROWS, PENNSYLVANIAN BREATHITT FORMATION, NORTHEASTERN KENTUCKY Timothy M. Thomas and Robert H. Blodgett, Department of Geology and Mineralogy, Ohio State University, Columbus, Ohio 43210

Cylindrical casts of lungfish aestivation burrows are reported from the Middle Pennsylvanian, uppermost Breathitt Formation of northeastern Kentucky. These are the first lungfish burrows from Pennsylvanian deposits of the Appalachian Basin, and indicate seasonal drought conditions existed in this area during Middle Pennsylvanian time. This supports paleobotanical evidence (Phillips and others, 1985) and paleoclimatic models (Rowley and others, 1985) for seasonal wet-dry, monsoonal climates in the Pennsylvanian of the Appalachian Basin.

Seven burrows, averaging 8 cm in diameter, were found in place in interbedded very fine grained sandstone and shale along a roadcut north of Louisa, Lawrence County, Kentucky. The sandstones are horizontally stratified and ripple cross-stratified, and are interpreted to be crevasse splay sheet-sands of a meandering river. Well-developed point bar deposits with lateral accretion cross-bedding and channel lags truncate these sheet sandstones and shales.

The sandstone burrow casts resemble those from the Middle Pennsylvanian Saginaw Formation of Michigan and the Permian of Texas and Oklahoma. The Permian burrows contain remains of the lungfish Gnathorhiza.

3:30 RELATIONSHIP OF SURFACE DRAINAGE TO CHATTANOOGA SHALE STRUCTURE IN THE WESTERN CUMBERLAND SADDLE AREA, SOUTH-CENTRAL KENTUCKY. Zuch, Don M. Blanco, Julius M., and Dean, Stuart L., Department of Geology, The University of Toledo, Toledo, Ohio 43606; Bensch, Dennis G., Finkbeiner, Pettis and Strout, Ltd., 4405 Talmadge Road, Toledo, Ohio 43623; and Kulander, Byron R., Department of Geological Sciences, Wright State University, Dayton, Ohio 45435.

Approximately 1500 wireline and drillers logs were used to define the subsurface structure of the Chattanooga Shale (Devonian) in nine, 7½ minute quadrangles in the western Cumberland Saddle area of south-central Kentucky. The dominant structural trend at this stratigraphic horizon is N40-50W with an additional N50-60E grain crossing most of the region. A strong E-W structural trend also extends across the northern and southern boundaries of the area.

Major stream drainage in the region shows a dendritic pattern, established primarily on the Lower Mississippian Fort Payne Formation at stratigraphic thicknesses ranging from a few tens of feet to over 200 feet above the Chattanooga. Major streams, such as the Barren River, follow the east-west structural grain along the southern border of the area, whereas smaller streams such as Little Barren River, Skaggs Creek and Peter Creek follow the northwest trend. Major tributaries generally parallel northeast Chattanooga structure. Most streams and tributaries show local variations to annular and radial patterns that reflect local Chattanooga highs and lows.

3:45 STREAM ANTICLINES: THE GRAND CANYON, ARIZONA. F. W. Cropp, Department of Geology, The College of Wooster, Wooster, Ohio 44691.

Stream or river anticlines have been described in the literature, most recently by Swinford (1985) in the Ohio Geology Newsletter. However, few geologists have seen river anticlines or are aware of their existence. Grand Canyon river trips traverse almost 100 km of Muav Limestone and Bright Angel Shale outcrops which dip away from the Colorado River and which are most easily explained as a river anticline. Paleozoic rocks above the Muav are not distorted or folded as are the Muav and Bright Angel near river level.

4:00 THE DELINEATION OF REMNANT HIGHS IN THE KNOX UNCONFORMITY USING GRAVITY AND WELL LOG DATA, Dr. P. Wolfe, Dr. B. Kulander, Dr. B. Richard, W. Armstrong, P. Kelly, C. Sweazy, Dept of Geological Sciences, Wright State University, Dayton, OH 45435.

Remnant highs within the Knox Unconformity of Ohio are examined within Cardington Township, Morrow County, Ohio. The intention of the study is to compare known remnant highs to gravity date collected over them.

A three square mile area in the northeastern portion of the township is focused upon here. It is chosen for its excellent well control and because it shows little major gravitational "noise" from other geologic features.

Two methods are used here to locate these remnant highs, and their usefulness is compared and contrasted. The first method is detailed well-log analysis of all the wells within the township. Structure contour maps of the Knox Unconformity itself, the Trenton Limestone and several rock units in between are constructed, as well as isopach maps between these units.

In the second method, the results of a detailed gravity survey are used. Because of the size of gravity anomalies produced by these remnant highs and their associated drape features (less than one mgal.), a high precision survey has been carried out. Survey parameters include 220 foot station spacings and a 0.1 foot elevation control at each station.

4:15 COMPARATIVE STUDY OF SEISMIC EXPLOSIVE SOURCES IN A THICK GLACIAL TILL AREA. James R. Plomer. 260 Brehm, Wright State University, Dayton, OH 45435

In this study three different types of explosives are utilized to collect seismic reflection data over the same traverse. A refraction profile reveals that between 5 and 115 feet of till cover bedrock along the line.

The data were processed utilizing the same processing parameters for each source. These parameters are also similar to those used to process soil compactor (Wacker) energy source data generated along the same seismic line. Final sections were produced utilizing refraction statics, gain recovery, frequency filtering, correlation statics, deconvolution and velocity filtering. The final sections are compared on the basis of reflection strength, continuity and resolution. A computer generated synthetic seismogram compares the final section with a predicted section.

The data demonstrates that shaped charges produced the best quality record of the three exposive sources. All of the explosive generated data are superior to those generated by the Wacker. The Wacker has a weak input signal which fails to penetrate effectively through an appreciable amount of glacial till.

4:30 A COMPARATIVE ANALYSIS OF SEISMIC DATA COLLECTED UTILIZING THREE DIFFERENT OFFSETS WITH THE MINI-SOSIE METHOD. Michael L. Schackne. Wright State University, 260 Brehm Lab, Dayton, OH 45435.

Shallow to intermediate seismic reflection data were collected in Oxford Township, Delaware County, Ohio as a part of a continuing research effort which utilizes a soil compactor as the energy source. The field design involves using three offsets at increasing distances from the first active geophone. Except for the variable offsets, the data collection procedure and processing sequence remain constant in order to achieve an objective comparison of the data quality and resolution for each offset.

The three final seismic sections produced from the processing are interpreted and compared to each other based on the signal amplitude, resolution and lateral consistency of the reflectors.

Previous work using the soil compactor has been completed in various parts of Ohio with results ranging from excellent to poor. The variability of the data quality is attributed to glacial cover, bedrock composition, and varying field designs. The present work gives a better insight as to how different geologic settings can effect the data quality and resolution using this type of energy source.

SECTION C. GEOLOGY
SECOND AFTERNOON SESSION - BOWMAN ODDY 3051
SATURDAY, APRIL 26, 1986
R.J. MALCUIT, PRESIDING

2:00 THE GILBERT-TYPE DELTA--AN ENTRENCHED MISNOMER. Anderhalt, Robert, Dept. of Geology, Bowling Green State University, Bowling Green, OH 43403

The Gilbert-type delta (GTD), once thought to be a generally applicable model of deltaic deposits, is now thought to be restricted to lacustrine deltas. This term has been cause for its share of controversy, partly because of the usage of descriptive and genetic criteria for its definition. Based upon the more descriptive criteria, it has been maintained that much, and perhaps nearly all of the Oak Openings sand of northwestern Ohio originated as a GTD in a glacial lake. A subsequent investigation of the literature has revealed some inconsistencies which give cause for a re-evaluation, if not the elimination of the use of this term.

While it is acknowledged that G.K. Gilbert is deservedly revered as one of the most prestigious North American geologists of at least the last two centuries, there are some ambiguities concerning the relevance of Gilbert's proposed mechanism for delta formation (1885, 1890) to the Bonneville deltas he described. The genetic criteria for a GTD are only implicitly based upon Gilbert's work and have not been critically evaluated with respect to the sediment characteristics as a check on the feasibility of these criteria. It is still maintained that at least some of the Oak Openings sand was deposited in a glaciolacustrine delta, although Gilbert (1890, p. 66) makes it quite clear that his mechanism for delta formation is not to be applied to glacial lakes.

2:15 **VALIDITY OF MODELS FOR DESCRIBING TREE ROOT STABILIZATION OF LANDSLIDE-PRONE HILLSLOPES** RIESTENBERG, Mary M., Dept. of Geology, University of Cincinnati, Cincinnati, Ohio 45221

The complexity of the distribution of roots within a soil and of the involvement of the roots in resisting shear failure of the soil necessitates the use of simplifying assumptions in modeling the stabilization of hillslopes by tree roots. Existing models use at least one of the following assumptions: 1) Roots fail within a shear zone or plane oriented parallel to the hillslope surface, 2) Root systems fail in tension as a unit, and 3) Roots are uniformly distributed throughout the soil mass. To test the validity of these assumptions, root distribution and roots' contribution to soil strength was studied. Two species of trees, sugar maple and white ash, comprising 60-80% of the biomass on disturbed, forested hillsides in southwest Ohio, were studied. Root systems were excavated and their dimensions, orientations, and the branching characteristics of major and minor roots described. The failure of roots in landsliding was reproduced by measuring the pull-out resistance of individual roots in situ.

The study demonstrates that: 1) Roots do not tend to fail within a discrete shear zone, but rather fail throughout the soil profile. 2) Root systems fail continuously by pulling out of the soil and/or by breaking in tension, rather than failing as a unit. If it were assumed that the total tensile strength of the root system was simultaneously mobilized, the calculated contribution of roots to soil strength would be 300 to 1000% too high. 3) The distribution of roots growing within the same soil is species dependant, and though highly variable, is broadly predictable within that species.

2:30 USE OF ACETATE PEELS IN THE ANALYSIS OF MICROSCOPIC AND MESOSCOPIC GEOLOGICAL STRUCTURES. Johnston, Matthew A., and Dean, Stuart L., Department of Geology, The University of Toledo, Toledo, Ohio 43606.

Fifty-five samples of various types of sedimentary, metamorphic and igneous rocks were selected for study by acetate peel methods. Fifteen specimens were carbonates that were exposed to standard dilute hydrochloric acid etch. These showed a variety of small scale sedimentary and metamorphic textures and structures after photographic enlargement of the peels. Five of these samples revealed sufficient information for quantitative determination of rock strain. Forty specimens were silicate rocks of sedimentary, metamorphic and igneous origin that revealed textures and structures from the acetate peels, after hydrofluoric

acid etch, that were comparable in quality to photomicrographs from thin sections of these rocks. Photographs of fifteen of these peels permitted determination of: sedimentary rock diagenetic effects from sandstones; strain values from several sedimentary and metamorphic tectonites; and chronology of development of igneous rock structures from four of the samples. Although optical characteristics of rock constituents cannot be determined from photographs of acetate peels, this method has the advantage of permitting a much larger section of the rock surface to be examined than through study of standard thin sections.

2:45 MINIMUM COMPACTIONAL POROSITY: A NEW GRAIN SHAPE MEASURE Harrell, James A., Department of Geology, The University of Toledo, Toledo, Ohio 43606

It has long been recognized that shape influences the extent to which loose grains can be compacted. Higher degrees of sphericity and roundness tend to result in lower compactional porosities because of reduced intergranular friction. These observations have suggested a new measure of grain shape: minimum compactional porosity. The methodology involves the following steps. (1) A uniformly sized sample (e.g., a sieve fraction) of sediment or disaggregated sedimentary rock is loaded into a cylinder along with isopropyl alcohol which acts as a lubricant. (2) The cylinder is placed in a water bath and vibrated ultrasonically until maximum compaction is achieved. (3) From the volume of compacted sample, and weight and average density of the grains, the minimum compactional porosity can be calculated. Experiments with a variety of sediment and rock samples has demonstrated that the minimum compactional porosity (MCP) decreases as sphericity and/or roundness increase. The MCP for a single size fraction (e.g., medium sand) or all size fractions (e.g., histogram of MCP vs. size) can be used to compare samples within a suite and thereby document shape sorting or changing provenance. The MCP shape measure has been successfully used to map the sediment dispersal pattern of the Marshall Sandstone (Mississippian) in the Michigan Basin.

3:00 HYDROTHERMAL SYNTHESIS OF SODIUM SILICATES, Croydon, Robert M. and Phillips, Michael W., Department of Geology, The University of Toledo, Toledo, Ohio 43606

Three sets of starting materials, each with a different Al to Si ratio, were prepared based on analcime formulas with Al to Si ratios of 1 to 2, 1 to 3, and 2 to 3, respectively. Several hydrothermal experiments for each of the different compositions were performed using single gold capsules and cold seal pressure vessels. The experiments were carried out over temperatures ranging from 300 to 500°C and at pressures ranging from 250 to 500 bars. The run durations ranged from 10 to 30 days. All of the run products, when analyzed by x-ray diffraction, were found to contain quartz and nitratite ($NaNO_3$). Paragonite ($NaAl_2(AlSi_3)O_{10}(OH)_2$) was found in all but one of the run products. In most of the run products analyzed, the presence of the nitrate acted as a sodium sink resulting in a marked decrease in the amount of sodium available for other reactions. In three of the run products with reduced levels of nitratite, albite was found in one while analcime was found in the remaining two. The formation of the albite in run 4, assuming paragonite and analcime as intermediate phases, is in agreement with previous work. Both analcime run products were estimated to have an Al:Si ratio of 3.7.

3:15 THE USE OF THERMAL ANALYSIS IN THE CHARACTERISATION OF PEAK DISTRICT LIMESTONES. D. Dollimore, Department of Chemistry, The University of Toledo, Toledo, Ohio, 43606, and A. Dyer and O.M. Wilson, Department of Chemistry and Applied Chemistry, University of Salford, Salford, M54WT, UK.

The Peak District is an area in the Southern Pennines of England containing extensive limestone beds of the lower carboniferous period. It is shown that differential thermal analysis (DTA) provides a method of distinguishing between the various limestone beds. The basis of this was the fact that the main endothermic peak in DTA and the main mass loss in thermogravimetric analysis (TGA) provided a measure of the carbonate content, but the overall "profile" of each DTA trace was significant in the process of identification. The samples were taken from two separate outcrops within each standard section and 8-10 samples from each location subjected to DTA. The main area of the DTA peak corresponding to carbonate decomposition was determined together with the standard deviation. Similar data in terms of mass loss was recorded using the TGA equipment. There was a close reflectance of these recordings with the full wet chemical analysis quoted for adjacent, but closely geologically related strata.

3:30 THE ROLE PLAYED BY SULFATES AND ASSOCIATED SPECIES IN THE MANUFACTURE OF PORTLAND CEMENT - A CASE HISTORY IN INDUSTRIAL GEOLOGY. M.C. Clark[+], D. Dollimore*, and A. Dyer[+]. *Department of Chemistry, The University of Toledo, Toledo, Ohio 43606. [+]Department of Chemistry and Applied Chemistry, The University of Salford, Salford, M54WT.

This project investigates the role played by sulfates and associated species in the manufacture of Portland cement and their influence on product quality. The sulfur compounds present in the clay or shale quarries in the cement works under consideration in Derbyshire, England are described. Various programs to assess the composition of the shale resulting from different modes of quarry operation are described. These programs allow the most suitable method of quarry operation to be selected in order to give a preselected shale sulfur content. Investigations into the reduction of the shale sulfur content by bacterial oxidation and subsequent leaching of the soluble sulfates are reported. A method of proportioning different shales to give a target sulfur content and the correct raw mix from local quarry material is described.

The sulfur content has to be kept to a low target figure, because it affects the feed through of the limestone-clay mix, and because the sulfur has an effect on the refractory lining of the kiln operation.

3:45 ELECTRON PROBE ANALYSIS OF MINERALIZED JOINTS FROM THE UPPER BEEKMANTOWN (LOWER ORDOVICIAN) IN THE NORTHERN SHENANDOAH VALLEY. Watkins, Michael L., Dean, Stuart L., and Phillips, Michael W., Department of Geology, The University of Toledo, Toledo, Ohio 43606.

Fifty-five oriented samples of limestone and dolostone were collected from the upper Rockdale Run Formation (Upper Beekmantown, Lower Ordovician) in the eastern and western belts of the Massanutten Synclinorium in the northern Shenandoah Valley. Forty-nine samples had mineralized joint fillings sufficiently well developed to study the relationship of the filling material to the surrounding rock. Wall rock and vein fillings were analyzed by electron probe. Traverses were made on all samples across the veins into the adjacent rock, as well as longitudinally along the veins.

Dolomite vein fillings were found only in six samples, all of which had dolostone country rock. Calcite veins were abundant in both limestone and dolostone samples. Eight specimens with dolostone country rock had quartz vein material, mostly authigenic, associated with calcite and dolomite mineralization. The presence of detrital quartz grains in a few veins suggests hydraulic injection during joint opening. Probe analyses and thin-section studies indicate that the source of the vein filling material was local, that is within a few centimeters, stratigraphically, of the surrounding rock. Structural criteria indicate that the veins apparently opened primarily during folding.

4:00 PETROGRAPHY OF THE ORISKANY SANDSTONE FROM FIVE WELLS IN OHIO AND PENNSYLVANIA. **Joseph D. Duminuco, Wright State University, Department of Geological Sciences, Dayton, Ohio 45435.**

The Lower Devonian Oriskany (Ridgley) Sandstone of the Deerparkian Stage is a major producer of gas and oil in the Appalachian Basin. The diagenetic and post-diagenetic history of the cement-porosity relationships has been studied in well cores from two wells in Ohio and three wells in Pennsylvania, representing in all some 300 drilled feet of Oriskany. Effective porosity is intergranular, intragranular and in fractures. The paragenetic events observed include: pressure solution of detrital quartz grains; euhedral quartz overgrowths on rounded detrital grains; silicification of fossil fragments; pressure solution of calcitic brachiopods and crinoids; deposition of calcite cement in pores; dissolution of quartz and replacement by calcite; dissolution of feldspars; introduction of carbonaceous matter as grain coatings and pore fillings; growth of authigenic clays and pyrite; stylolitization and fracturing.

4:15 A REFINEMENT OF THE STRUCTURE OF POLLUCITE. Beverstock, David M. and Phillips, M. W., Department of Geology, The University of Toledo, Toledo, Ohio 43606.

The crystal structure of a pollucite crystal ($Na_{.12}Cs_{.75}Al_{.87}Si_{2.13}O_6 \cdot 0.25\ H_2O$) from Hebron, Oxford Co., Maine (Harvard Museum #90532) has been refined in space group *Ia3d* (a=13.689(1)) using a CAD4-VAX750 diffractometer system employing a monochrometer and Mo_K radiation. The refinement is based on 324 non-zero, non-equivalent averaged reflections using unit weights. This refinement confirms the basic features of Beger's model. Namely, some Na occupies the 24c sites and the water molecules are in the Cs cavities which is the case for the structurally similar mineral analcine ($NaAlSi_2O_6 \cdot H_2O$). However, difference Fourier syntheses coupled with site refinement for Na suggest that the amount of Na occupying the 24c sites is subtantially less that would be expected from the chemical analyses.

The final refinement with isotopic temperature factors and occupancies based on Beger's model and chemical analyses yielded an agreement factor: R_w=0.050. A difference Fourier synthesis at this stage indicated two small but significant positive peaks disposed about the Cs site at a distance of about 0.8Å. These peaks disappeared when Cs was allowed to refine anisotropically (R_w=0.050). It remains unclear whether these peaks represent slight positional disorder of H_2O in the cavity or are merely antifacts arising from the isotropic constraint on Cs.

SECTION C. GEOLOGY
POSTER SESSION - STUDENT UNION, INGMAN ROOM
SATURDAY, APRIL 26, 1986

Board C @ 9:00 AM SEDIMENTOLOGY OF TRACE FOSSILS IN CARBONIFEROUS ROCKS FROM SOUTH-CENTRAL KENTUCKY. CLOSE, Jay C., Dept. Geology, Southern Illinois Univ., Carbondale, IL 62901, & MARTIN, Wayne D., Dept. Geology, Miami Univ., Oxford, OH 45056

Sedimentological interpretations of Carboniferous ichnofossils from south-central Kentucky have been combined with other data in order to formulate refined paleoenvironmental reconstructions. Ichnofossils from the Chesterian shallow marine and Morrowan fluvial-deltaic lithofacies generally occur as hypichnia displaying positive semi-relief, and are generally confined to fine-grained sandstones that directly overlie shales. The ichnofossils are relatively rare, indicating that environmental conditions present during Chesterian-Morrowan sedimentation were mostly harsh. Preservational bias has destroyed any evidence of body fossils that may have been existent. Crawling, grazing, and feeding ichnofossils are the most common types. The vagile, deposit - feeding fauna ingested nutrients that had settled out of suspension onto relatively firm clay substrates. The fauna probably would not have searched for food on mobile clay surfaces because of burial risk; therefore, these areas had to have experienced appreciable dewatering prior to invasion.

Board D @ 9:00 AM COLLISION TECTONICS, FORMING THE BASINS FOR THE GREAT LAKES — WITHOUT GLACIERS. Chester A. Davis, Technician, Department of Physics Marietta College, Marietta, Ohio 45750

Cross-sectional distortions of the Great Lakes basins and other evidence, reveal the necessity for an alternative theory for the origin of the Great Lakes. Three phases of collision forces are proposed as having made these lakes. The first phase suggests opposing forces between our orbiting planet and a colliding comet. Thrust could provide a source of kinetic energy over a short time to deform strata of the Great Lakes Region. A mechanical device shows how some strata can be distorted by a simulated collision. The device moves a simulated quantity of strata, while a simulated colliding comet produces a retarding force. The comet is proposed as having had a diameter of 30 kilometers; striking Earth with a velocity of 42 km/sec. Affected strata were moving in opposition with a velocity of 29.78 km/sec. The second phase of action — acting simultaneously with the first — was the hurling of crustal materials, which fell and covered the warped basins with sand, gravel, clay and other fallout — including ice. The third phase of action in making the Great Lakes was the melting of the hurled ice from the Arctic ice cap, which soon filled the new basins to overflowing with catastrophically produced meltwater. A mid-continent flood occurred at that time, at the beginning of the Ice Age, rather that at its end. These findings are a much-needed breakthrough. They show why glaciers were possibly not involved in creating the Great Lakes.

SECTION D. MEDICAL SCIENCES
FIRST MORNING SESSION - STRANAHAN 114
SATURDAY, APRIL 26, 1986
SAM ROSEN, PRESIDING

9:00 THE EFFECT OF VASOPRESSIN REPLACEMENT ON HEART RATE IN FOOD-DEPRIVED, VASOPRESSIN-DEFICIENT RATS. Steve J. Schomisch, Cyrilla H. Wideman, and Helen M. Murphy. John Carroll University, Cleveland, Ohio 44118.

Research indicates that food-deprived, vasopressin-deficien (Brattleboro) rats exhibit bradycardia when compared to controls. This study was an attempt to investigate the effects of vasopressin replacement on heart rate in food-deprived Brattleboro rats. Four groups of Brattleboro rats were utilized: 1) food deprived for 23 hrs/day and given daily injections of vasopressin, 2) food deprived for 23 hrs/day and given daily injections of peanut oil, 3) food deprived for 23 hrs/day and given no injections, and 4) not food deprived and given no injections (control). Following a 7 day habituation period, rats were maintained on this protocol for 9 days. Each day an EKG was recorded. Heart rates for each day of the experimental period were compared with the rate on the last day of habituation. Statistical analysis of heart rates revealed a significant difference i the % increase or decrease in heart rate on day 2 of the experimental period. Vasopressin injected animals had a significantly greater increase than the other groups. On day 3, all groups except the control group had a significan decrease in heart rate, with the vasopressin injected group showing attenuated effects when compared with the other two experimental groups. The results of this experiment indicate that vasopressin replacement is effective in delaying the onset of bradycardia in food-deprived Brattleboro rats.

9:15 Longitudinal Study of Oxygen Consumption Changes in Bone Marrow Cells of DBA/1J Mice Implanted with RaVe Lymphoblastic Lymphoma. Patricia J. Cockrell, Gregory S. Bambeck, Raymond M. Gesinski, Biological Sciences, Kent U. Kent, OH 44242.

All Rave tumor mice die eight days post implant. This tumor has a 100% efficacy in DBA/1J mice. Oxygen consumption of bone marrow cells from normal and tumor implanted mice were done on a YSI-model 51 oxygen monitor. During the first five days the oxygen consumption of bone marrow cells from tumor implanted mice was lower than normal. In previous works we have shown that the sixth day is the transition day for the implanted animal.

The normal mouse bone marrow consumed 2.6µl/1X10^7 cells/60 min..Five day post implant bone marrow cells consumed 1.4 µl/1X10^7 cells/60 min..Six day post implant bone marrow cells consumed 2.8 µl/1X10^7 cells/60 min. Eight day post implant bone marrow cells consumed 3.2µl/1X10^7 cells/60min. The DBA/1J mouse demonstrates severe hematocrit drops and progressive cachexia during and after the transformation phase. We postulate that progressive hypoxia in bone marrow induces increased mitochondriac activity in bone marrow cells of cachexic mice.

9:30 DEVELOPMENT OF A TWO-STAGE MODEL FOR TRANSPLACENTAL CARCINOGENESIS IN THE MOUSE. Christopher M. Weghorst, James E. Klaunig and Gary D. Stoner. Department of Pathology, Medical College of Ohio, 3000 Arlington Ave., Toledo, Ohio 43699.

Our laboratory is currently investigating the mechanisms of two-stage carcinogenesis (tumor initiation and tumor promotion) in newborn and fetal animals. Previous studies have shown the mouse fetus to be highly susceptible to the development of neoplasia when exposed in utero to chemical carcinogens. In the present study, male and female C3H X A/J strain mice received a single dose (5-50 mg/kg body wt.) of ethylnitrosourea (ENU) via maternal intraperitoneal injection at day 15 of gestation. At parturition, one half of the newborns received drinking water containing 500 ppm phenobarbital (a known tumor promoter) while the other half were given normal water. The mice were sacrificed and examined for hepatic and pulmonary tumors at various time intervals up to 6 months after weaning. Appropriate controls were also performed for comparison. The development of a two-staged carcinogenesis model in embryonic exposed

mice may be beneficial for a) the study of the mechanisms involved in the tumor initiation and promotion of embryonic and fetal organs and b) the reduction of time and cost involved in the detection of tumor initiators and/or tumor promoters. The latter being a result of a shorter latency period of tumor development exhibited by transplacentally treated animals compared to animals exposed as adults.

9:45 EFFECTS OF BREAST SELF-EXAMINATION ON STAGE OF BREAST CANCER

by: Joshua Muscat, Ohio Dept. of Health, P.O. Box 118, Columbus, Ohio 43266-0118.

The frequency of breast self-examination(BSE), breast examination by physician & mammography was studied in relation to pathologic stage of disease. Data was examined using the population based case-control study, the Center's for Disease Control's Cancer & Steroid Hormone Study (CASH). Stage of disease for 918 newly diagnosed breast cancer patients aged 20-54 was obtained using the Connecticut Tumour Registry. A nondiseased control group of 887 age-matched women randomly selected from the population of Connecticut was also studied.

After adjusting for the effects of mammography & physician examination, no association was found between stage of disease & frequency of BSE. The use of an early stage comparison group to late stage cancerous women allows the comparison of these results to prior studies on the efficacy of BSE. However, an early stage comparison group might provide a biased result. It is likely that among those women who had cancer detected at an early stage, some had a higher frequency of breast screening techniques than the general population of women. Lead-time bias among early stage would make late stage vs. nondiseased women a more appropriate comparison. Using the nondiseased control group & adjusting for known & suspected risk factors for breast cancer, frequency of BSE still was not found to be associated with stage of disease. Prospective studies need to show the value of BSE before it's use is widely advocated.

SECTION D. MEDICAL SCIENCES
SECOND MORNING SESSION - STRANAHAN 118
SATURDAY, APRIL 26, 1986
MARTHA KREIMER-BIRNBAUM, PRESIDING

9:00 COMPARATIVE HEPATOTOXICTY OF HALOGENATED HYDROCARBONS IN RAT, MOUSE, DOG, AND PRIMATE PRIMARY HEPATOCYTES. Norman E. Schultz and James E. Klaunig. Department of Pathology, Medical College of Ohio, Toledo, Ohio, 43699.

Our laboratory is investigating the cellular mechanisms of hepatocellular toxicity and carcinogenicity. Previous in vivo studies have shown a species variability in response to the toxic and carcinogenic effects of chemical compounds on hepatic tissue. Rodent hepatocytes in primary cell culture have been shown to closely duplicate in vivo response to toxic compounds. In the present study we 1) developed methods for the isolation and culture of canine and primate (monkey) liver, 2) investigated the comparative toxicity of carbon tetrachloride (CC14), chloroform (CHC13), trichloroethylene (TCE), and trichloroethanol (TCEth)sing cultured hepatocytes form the 4 species. Relative toxicity of the 4 compounds in the 4 species is shown below with the species most sensitive to the toxic effects of the compound listed first. Toxicity for: CC14 showed mouse > rat > dog; CHC13 showed mouse > rat > dog; TCE showed mouse > monkey > rat > dog; and TCEth showed mouse > dog > monkey > rat.

9:15 CELL-FREE TOXINS OF KILLER YEASTS. Y-H CHIU and P F LEHMANN. Microbiology Department, Medical College of Ohio, C. S. #10008, Toledo, Ohio 43699.

Cell-free toxins from Debaromyces vanriji (ATCC 36898), Kluveromyces marxianus var. marxianus (ATCC 36907), K. marxianus var. lactis (ATCC 8585) and Saccharomyces cerevisiae ("superkiller"; strain T158C X 514a) were prepared in culture supernatants after killer yeasts were grown in acidic nutrient broth. The toxins were assayed on plates seeded with a sensitive yeast strain (either Candida albicans or S. cerevisiae).

Toxins were concentrated via filtration through membranes having pore sizes allowing passage of molecules with MW $<$10,000 or MW $<$ 25,000. In some cases, the toxins were concentrated using a hollow fiber membrane filter which allowed for a rapid production and large volume of product. The cell-free toxins could be applied to filter paper discs and these discs used for testing the sensitivity of different yeast strains. Discs could be stored at -20°C.

The toxins were inactivated by heat or alkaline conditions. Characterization of the toxins' behaviour on a column containing Sephacryl 200 (Pharmacia), showed that the D. vanriji toxin could be further purified by this procedure. Other toxins were lost or inactivated on the column, even when using buffer of high ionic strength.

9:30 EFFECTS OF NICOTINE ON RAT ORAL MUCOSA. Kathleen L. Schroeder and Jeffrey A. Babushkin College of Dentistry, Ohio State University, Columbus, Ohio 43210

This research studied the early changes associated with topical nicotine administration at concentrations relative to popular smokeless tobaccos(ST), and measure the relative absorption of nicotine using cotinine as indicator. Twenty-seven Sprague Dawley rats(14 mos, 600-650 gms)were divided into 7 groups as follows: Control groups- I-swabbing only, II-pumice in orabase; Treatment groups- III-1.6mg/gm nicotine in orabase, IV-5.6mg/gm nicotine in orabase, V-ST(1.4 mg/gm nicotine), VI-ST(5.6mg/gm nicotine), VII-ST(1.6 mg/gm nicotine). These groups received administrations 3 hours/day for up to 95 days in the lower lip pouch. After oral examination, the rats were sacrificed at intervals of 3,7, 40, and 95 days. Gingival and labial mucosal specimens were divided for SEM and light microscopic examination. Blood samples were taken at sacrifice for determination of cotinine levels. The findings reveal a hyperkeratosis, an increase in mitotic activity, an acanthosis and dyskeratosis using light microscopy. SEM observation revealed ulcerations epithelial denudation, leukocytic infiltration, and hemorrhage. Cotinine levels were highest in group V followed by groups III and IV. Differences in cotinine concentration used as an indicator of absorption of nicotine, appears to be reflected in the morphological changes observed in groups III, IV and V.

9:45 ERYTHROCYTE PROTOPORPHYRIN (E.P.): IMPROVED METHODOLOGY FOR DETECTION OF LEAD POISONING. Michael R. Lust and Martha Kreimer-Birnbaum, St. Vincent Medical Center, 2213 Cherry St., Toledo, OH 43608.

Lead poisoning is still a problem of significant magnitude among low socioeconomic pediatric populations as well as in industrial settings. Determination of E.P. is the screening method of choice, presenting several advantages over direct blood lead testing. Ten µl of whole blood is added to a suspension of diatomaceous earth and extracted with ethyl acetate:acetic acid (4:1 v/v). Porphyrins are later extracted into dilute HCl and quantitated by fluorometry, using coproporphyrin as a standard. Evaluation of the method's performance over four years of participation in the Centers for Disease Control E.P. proficiency testing program has shown excellent agreement with the targeted values (mean 97.5%, standard error of the mean = 0.9%). In addition to its excellent performance record, this method offers advantages over similar solvent extraction procedures: it requires fewer technical steps, utilizes a more stable standard for fluorometry, and very important, its overall cost is lower. (Supported in part by a grant from the F. M Douglass Foundation.)

SECTION D. MEDICAL SCIENCES
FIRST AFTERNOON SESSION - STRANAHAN 114
SATURDAY, APRIL 26, 1986
SAM ROSEN, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 SYMPOSIUM ON NEUROSCIENCE
NEUROSCIENCE: YESTERDAY, TODAY AND TOMORROW
KEITH ALLEY, CONVENER

3:00 VANADIUM-INDUCED LIPID PEROXIDATION IN THE RAT BRAIN. Parinandi, N. and W. Jyung, Department of Biology, University of Toledo, Toledo, OH 43606

Effect of three oxidation states of vanadium viz. III, IV, and V on lipid peroxidation (spontaneous autoxidation) in rat brain cerebral cortex homogenate and its partially purified membranes was investigated. Phospholipid

liposomes were also used as a model system. Formation of the thiobarbituric acid reactive materials (TBARM) 90 minutes after incubation with the element in the lipid model system was used as an index of lipid peroxidation measured spectrophotometrically. Of all the three oxidation states screened, vanadium (III) appeared to be the highest, vanadium (IV) appeared to be intermediate, and vanadium (V) appeared to be the least in their lipid peroxidation inducing capacities. The dose-response relationships of all the three oxidations states of vanadium and the mechanisms of lipid peroxidation will be presented.

3:15 RECTILINEAR RECORDING OF VALSALVA'S MANEUVER: A POWERFUL TOOL IN THE CLINICAL EVALUATION OF THE AUTONOMIC NERVOUS SYSTEM.

Walter L. Olson, MD.
Toledo Neurological Institute
3949 Sunforest Court
Toledo, Ohio 43623

Since the description of the valsalva ratio by Levin in 1966 the valsalva maneuver has been used to assess the parasympathetic reflex and/or overall autonomic function of the cardiovascular autonomic enervation. The valsalva ratio utilizes functional changes in heart rate which depend on the integrity of both β adrenergic enervation and parasympathetic function. The rectilinear recording of the valsalva maneuver allows extraction of α and β adrenergic responses and of parasympathetic response separately. An α ratio (hypertensive overshoot response), a β ratio (tachycardic response) and a parasympathetic ratio (bradycardic response) are proposed. Patients with sympathetic, parasympathetic and autonomic failure studied with valsalva's maneuver are presented to illustrate these concepts.

3:30 DEVELOPMENT OF HYPOTHALAMUS-PITUITARY-ADRENAL (HPA) AXIS IN YOUNG RODENTS: INFLUENCE OF THIOURACIL OR CONGENITAL HYPOTHYROIDISM.

Lee A. Meserve, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

For appropriate output of adrenal steroids after stress, proper development of hypothalamus-pituitary-adrenal (HPA) axis in mammals is required. Response of the axis in young rodents is grossly sub-adult, with maturation to adult levels around 1 mo of age. Functional capabilities of HPA components of rat and mouse pups from dams fed thiouracil (0.25%) and from congenitally hypothyroid mice were measured with in vivo and in vitro techniques. Normal pups evidenced a rise in serum costicosterone 15 min after ether stress or ACTH injection, which increased from 15-25 days of age. Ether response was prevented by thiouracil to 30 days, but ACTH caused corticosterone release at 15-35 days. Delayed maturation of the hypothalamic HPA component was suggested by absence of thiouracil-modified basal corticosterone. This suggestion was supported by in vitro perifusion studies of 15 day old rats, as thiouracil did not change adrenal response to ACTH or pituitary ACTH content, but lowered hypothalamic bioactive CRF by 95% and immunoreactive CRF by 61%. Hypothalamic extracts from 15-30 day old congenitally hypothyroid mice contained less immunoreactive CRF than from euthyroid littermates, but differences were less than with thiouracil. Congenital hypothyroidism seems to influence HPA development less than thiouracil.

3:45 STRAIN-TYPING YEASTS. LE Cowan, RM Jones, WJ Ferencak III, PF Lehmann. Microbiology Dept., Medical College of Ohio, CS 10008, Toledo, OH 43699

Differential susceptibility to killer yeasts and the presence or absence of agglutination by lectins and antibodies were used as a basis for biotyping yeasts. Using killer yeasts alone, 60 isolates of Candida albicans were placed into 34 biotypes. Those biotypes containing 5% of the isolates could be further subdivided with monoclonal antibodies. Other yeast species could be biotyped in the same manner and showed differences in their susceptibility to certain killer yeasts and to agglutinability by lectin and antibody. Eg., while C. albicans and C. tropicalis were killed by Debaromyces vanriji (ATCC 36898), Saccharomyces cerevisiae and Cryptococcus neoformans were not. The use of many killer yeasts and antibodies greatly improved the biotyping procedure initially reported by Polonelli et al., who subdivided C. albicans into several biotypes. However while our largest biotype group held 7% isolates, 52% of their isolates fell in a single biotype group. The procedure will be useful for monitoring yeast spread in hospitals and in other environments. (LEC and RMJ were participants in the Research Apprenticeships in Science Program).

4:00 HEALTH ATTITUDES AND NICOTINE CONSUMPTION IN SMOKELESS TOBACCO USERS. Kathleen L. Schroeder and G.B. Iaderosa, College of Dentistry, Ohio State University, Columbus, Ohio 43210

150 randomly chosen male subjects 50 smokeless tobacco(S.T.) users, 50 smokers, and 50 non-smokers were divided into 3 groups and surveyed for tobacco habits and health attitudes. The nicotine yields(mg/g of tobacco) of the S.T. user's 1° brand of choice were determined for a "potential" usage profile. Light(0-89mg nicotine/week or 0-½pkgs), Moderate (90-388mg nic./wk or ½-2pkgs)and Heavy(388+ mg nic./wk or 2+ pkgs.)groups were established from data with a mean nicotine yield of 238mg/wk(S.D.=150mg/wk). A frequency determination of the age of onset for specific tobacco habits showed a bi-modal curve for ST users and a uni-modal curve for smokers. The 2 peaks for ST users were at age 16(n=6) and age 18(n=15) compared to one peak at age 16(n=9) for smokers. This suggests two different populations among ST users. Analysis of education level, years of use, and weekly nicotine consumption were done. Those initiating ST usage at a young age(-15 yrs) exhibited a lower level of education(11.4 years completed) than those with an older age of onset(14.1 yrs completed). This data proved highly significant(P-.01). 60% of the young initiators lived in a rural setting as compared to 40% of the older initiators. Young initiators used ST twice as long as older initiators(P-.05). 68% of all ST users who quit smoking began their habit as an alternative to smoking. This study distinguished ST users and smokers and established a definition of the ST user.

4:15 SURVEY OF STERILIZATION AND ASEPSIS PROCEDURES IN DENTAL OFFICES. Lynn Mlakar and Sam Rosen. The Ohio State University College of Dentistry, 305 West 12th Avenue, Columbus, Ohio 43210.

Although recent publications have recommended procedures for sterilization and disinfection in the dental office, virtually no information is available regarding current practices. The purpose of this study was to obtain information from dental practitioners about their asepsis procedures, and to compare the findings wiht the guidelines for infection control established by the ADA's Council on Dental Therapeutics.
A questionaire was sent to 4000 randomly selected dentists in California, North Carolina, and Ohio. Of the 513 responding offices, "effective and preferred" methods of sterilization were used by 96% of offices for the sterilization of surgical instruments; decreasing to 52% of offices for the sterilization of general hand instruments. For their handpieces, "ineffective" methods of sterilization methods were reported by 85% of offices. The only acceptable practice in the use of injection needles is to dispose after each patient. However, 2.3% of offices reported "sterilizing" needles between patients.
This study identified a variety of aseptic techniques being employed in today's dental offices. The survey showed that reusable instruments and materials are not being sterilized by acceptable procedures, and may be a pathway for the transmission of disease. The need to convey information from the scientific community to the dental practitioner is obvious.

4:30 FATAL OCCUPATIONAL INJURIES IN OHIO, 1984.

John Paulson, Div. of Epidemiology, Ohio Dept. of Health, P.O. Box 118, Columbus, O.43266-0118

A review of Ohio 1984 death certificates identified 178 deaths which were the result of occupational injuries received in Ohio. Information on circumstances of injury; usual occupation and industry of decedent; county of residence and occurrence; age, race, and sex of decedent; month, day of week, and time of day of injury; and time elapsed between accident and death was abstracted from the death certificates. A descriptive epidemiology of this series is presented.
Mechanical energy represented the etiologic agent in 75% of the fatalities, with road vehicle accidents responsible for 46 deaths. An additional 27 deaths were the result of falls. Electrical energy was the etiologic agent in 17% of the fatalities.
Mortality rates are determined for occupational groupings utilizing Census labor force estimates as the denominator. Rates are shown to be high among construction workers and truck drivers.
The accuracy and completeness of this death certificate series is evaluated through comparison with Industrial Commission of Ohio accident claim statistics.

4:45 SEROEPIDEMIOLOGICAL STUDY ON PERSONS LIVING NEAR A HAZARDOUS DISPOSAL SITE IN NORTHERN, OHIO. Ravishankar A. Rao, Deborah L. Gray. Ohio Department of Health, 246 North High Street, Columbus, Ohio 43266-0588.

In 1985, the Sandusky County Ohio Department of Public Health and the Environmental Unit of the Ohio Department of Health conducted a biological monitoring clinic in response to concerns raised by a group of residents in proximity to a hazardous waste disposal facility in Sandusky County. This clinic involved persons living within a 1-mile of the facility. The facility is used as a dump waste site for various toxic chemicals. The residents surrounding the site in Vickery have complained about headaches, odor, and many symptoms. This study of 27 residents and 34 controls was prompted by findings of earlier investigation which showed statistical difference between Vickery residents and demographically similiar group in Sandusky Co. Blood samples from this study and referent groups were compared on a number of physiologic parameters including enzyme levels and formed blood elements. The relative health status of the two groups was compared using Student 't-test with appropriate data transformations.

SECTION D. MEDICAL SCIENCES
SECOND AFTERNOON SESSION - STRANAHAN 118
SATURDAY, APRIL 26, 1986
MARTHA KREIMER-BIRNBAUM, PRESIDING

3:00 Acoustic Modeling of Infant Vocal Tracts

C. Robert Pearsall II
1133 Robinson Lab
206 W. 18th Ave.
Columbus, Ohio 43210

A program for the frequency-domain analysis of vocal tracts, TBFDA, was applied to the analysis of infant vocal tracts. The previously available program was modified to allow extensive user interaction and the application of an iterative convergence scheme. This allows the generation of plausible vocal tract configurations corresponding to a set of experimental formants (i.e., resonant frequencies). Sample results show good performance of the convergence algorithm for some vocal tract types.

3:15 AN IMMUNOHISTOCHEMICAL METHOD FOR DETERMINING THE CHROMAFFIN-POSITIVE CELLS IN THE ADRENAL GLANDS OF INFANTS IN THE FIRST YEAR OF LIFE. L.T. Calcamuggio, J.R. Patrick, *C.A. Heckman, *L.A. Meserve, Department of Pathology, Medical College of Ohio, C.S. 10008, Toledo, OH 43699 and *Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

The purpose of this study was to develop an immunohistological method for determining the chromaffin tissue in the adrenal glands by infants in the first year of life. This was accomplished by determining the dilution and incubation time for optimal staining with the primary antibody, determining the number of sections required to estimate the volume of chromaffin cells within an error of 5% and calculating the volume and weight of the chromaffin cells in a selected group of adrenal glands. This study made use of an antiserum developed against chromagranin. It was used in a dilution of 1:100 with an incubation period of 20 hours in a humidity chamber. A sequential tissue block thickness of 2 mm was determined to be needed to create the number of sections that would provide a volumetric estimation of the chromaffin cells within a tolerable error. Analysis of the results suggests that the volume of chromaffin cells measured by this method was an indication of the functional adrenal medulla in these infants.

3:30 CHANGES IN VENO-ARTERIAL CARBON DIOXIDE DISTRIBUTION DURING APNEIC OXYGENATION WITH CONCURRENT EXTRACORPOREAL CARBON DIOXIDE REMOVAL. P.D. Beckley, M.S. and R.D. Tallman, Jr., Ph.D., School of Allied Medical Professions and Department of Anesthesiology, The Ohio State University College of Medicine Columbus, Ohio, 43210.

Reversal of the usual carbon dioxide partial pressure (pCO2) drop across the lung has been previously noted with the application of apneic oxygenation (AO) with extracorporeal CO2 removal (ECCO2R). A suggestion has been made that this observation is the result of CO2 displacement from the saturation of hemoglobin with subsequent accumulation in the arterial blood (the Haldane effect). Eight pigs were studied using AO with ECCO2R via a membrane lung. A total of 66 data collections were made with varying degrees of hemoglobin oxygen saturation occuring. The results show that arterial pCO2 is higher while CO2 content, bicarbonate, and pH are reduced when compared with the corresponding venous values. It was additionally found that the greater the hemoglobin oxygen saturation change, the greater the veno-arterial pCO2 change. It can be shown that a portion of this CO2 accumulation is buffered by the usual blood mechanisms resulting in the changes observed in the CO2 content, bicarbonate, and pH. (Supported by grants from the American Society of Extracorporeal Technology and NIH HL-29715.)

3:45 FLUORESCENT PROBE LABELING OF THE CYSTEINE UNIT OF 3-HYDROXYACYL COENZYME A DEHYDROGENASE AND ITS INHIBITION BY LONG CHAIN ACYL COENZYME A ESTERS. Phinehas P. Barnes III, Thomas J. Kunkel Jr., Daniel J. McLoughlin, Department of Chemistry, Xavier University, Cincinnati, Ohio 45207

The effect of varying concentrations of long chain Coenzyme A esters upon the catalytic activity of 3-Hydroxyacyl Coenzyme A Dehydrogenase (E.C.1.1.1.35) has been examined. Plots of percent remaining activity vs. ester concentration give an I_{50} of 30 μM for octanoyl Coa and an I_{50} of 5 μM for dodecyl CoA. Preincubation studies demonstrate that this inhibition is reversible but that a slow irreversible inhibition occurs at high concentrations of dodecyl CoA. In order to correlate functional activity changes with structural changes, 3-Hydroxyacyl Coenzyme A Dehydrogenase has been labeled with the sulfhydryl specific fluorescent probe 1,5-IAEDANS. Stoichiometric measurements demonstrate the covalent binding of one label per subunit of enzyme. The specific activity of the modified enzyme is 80% of the native enzyme. Initial studies demonstrate at least a 15% quench in the fluorescence upon binding of the octanoyl ester of Coenzyme A. (Supported in part by Petroleum Research Fund Grant #16627-B3)

4:00 COMPARISON OF LIVER SUPEROXIDE DISMUTASE LEVELS IN MALE AND FEMALE BALB/C MICE AT DIFFERENT AGES. Norman Grimes, Augusta Askari, Norman E. Schultz, James E. Klaunig. Medical College of Ohio, Depts. of Surgery and Pathology, Toledo, Ohio 43699

Since superoxide dismutase (SOD) is an enzyme vital to the body's defenses against superoxide radicals formed by normal intermediary metabolic reactions, this study was undertaken to evaluate variations in liver SOD levels in response to aging and sex. Twenty BALB/C mice were placed in either Set I or II. Each set consisted of 2 groups with 5 male or 5 female animals/group. The SOD level in liver was monitored for Set I at 4 weeks and for Set II at 44 weeks of age. Before analysis, livers were perfused with 0.9% saline, excised, homogenized and sonicated in cold 0.32 M sucrose with 0.1 mM EDTA and centrifuged. SOD was analyzed by pyrogallol method spectrophometrically over 5 minutes; protein by Bio-Rad. Data were evaluated by Student's t-test with high significance for 44 week old mice. Female mice had higher SOD levels in liver than did male mice. These results may have implications for observations that female mice develop fewer tumors than male mice when both are injected with known carcinogens and also for observations that females tend to live longer than males. (Funded in part by NSF grant, RESEARCH PARTICIPATION FOR HONORS TEACHERS PROJECT, UNIVERSITY OF TOLEDO).

4:15 STRAIN COMPARISON OF OXYGEN FREE RADICAL DETOXIFYING ENZYMES IN MURINE LIVER. Joseph M. Saul, James E. Klaunig, Bonnie K. Loeser, and Augusta Askari. Departments of Pathology and Surgery, Medical College of Ohio, Toledo, Ohio, 43699.

The mouse is the most widely used species in cancer research. The murine liver is particularly sensitive to the development of neoplasia following exposure to chemical carcinogens. Strain and sex differences have been shown in the hepatic tumor response in the mouse. Recently, the generation of oxygen free radical species by carcinogens has been suggested to play a role in the induction of neoplasia. Cells possess enzymes (superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GP)) that are able to detoxify free radical species. The present study was undertaken to compare the relative

concentrations of these detoxification enzymes in male and female C3H, BALB/c, B6C3F1, and C57/B1 mice. Female mice in each strain displayed higher levels of SOD, CAT, and GP than their male counterparts. For SOD; C57 > B6C3F1 = BALB/c > C3H. For CAT; BALB/c > C3H > B6C3F1 > C57. For GP; C57 > B6C3F1 > BALB/c > C3H.

4:30 HEMATOPORPHYRIN DERIVATIVE (HpD) PHOTODYNAMIC THERAPY: EFFECTS ON NORMAL RAT INTESTINE. G.M. Garbo, K. Chaudhuri, R.W. Keck, S.H. Selman, & M. Kreimer-Birnbaum. St. Vincent Medical Center, 2213 Cherry St., Toledo, OH 43608; and Medical College of Ohio, Toledo, OH

Photodynamic therapy (PDT) of tumors with HpD, a mixture of dicarboxylic porphyrins in various states of aggregation, is based on the selective retention of porphyrins by neoplastic tissue concomitant with their rapid clearance from normal surrounding tissue. Previous studies of PDT of normal intestine have shown: a) sustained decreases of blood flow (Selman et al., Cancer Res., in press) and b) extensive mucosal and submucosal damage. In order to correlate these changes with intestinal levels of porphyrins, jejunal segments of Fischer 344 rats were perfused with NaCl (0.9%) and homogenized in HEPES buffer, pH 7.0. Porphyrins were extracted with a mixture of ethyl acetate:acetic acid and their concentration determined in HCl. Intestinal segments from non-HpD injected rats showed levels of porphyrins of 0.14-0.16 μg/g wet weight. Twenty-four hr after injections of 10 or 20 mg HpD/kg body weight, the intestinal porphyrins increased from eight to twentyfold, respectively. These experiments do not differentiate if the porphyrins were in the mesenteric circulation or taken up by intestinal cells. These increased porphyrin levels may be responsible for the decreased blood flow and for the morphological changes observed in the normal intestine after PDT. (Supported by F.M. Douglass Foundation and N.I.H. R23 CA38754-01.)

4:45 MODIFIED PORPHYRINS AS TUMOR PHOTOSENSITIZERS. G.M. Garbo, K. Chaudhuri, R.W. Keck, S.H. Selman, & M. Kreimer-Birnbaum. St. Vincent Medical Center, 2213 Cherry St., Toledo, OH 43608; and Medical College of Ohio, Toledo, OH.

Photodynamic therapy (PDT) is an evolving modality of cancer treatment. Photosensitizers such as dicarboxylic porphyrins (Hematoporphyrin Derivative = HpD) are systemically administered and accumulate preferentially in the tumors. Subsequent tumor destruction occurs as a result of the activation of the sensitizer with light. Although enhanced tissue penetration (and destruction) is achieved by using red light (λ > 590 nm), the activation of the HpD components is low in this region. A group of modified tetraazatetrabenzoporphyrins having a stronger absorption in the red were studied. AY-27 rat bladder tumor cells, derived from a FANFT (N-(4-(5-nitro2-furyl)-2-thiazolyl)formamide) induced transitional cell carcinoma, were incubated for 1 hr at 37°C with HpD or the modified porphyrins, followed by 5 min of phototreatment (λ > 590 nm). The modified porphyrins gave phototoxic effects comparable to those observed with HpD. In vivo PDT studies (360 joules/cm^2) were performed in transplantable AY-27 urothelial tumors in Fischer 344 rats. Tumor necrosis was observed with the modified porphyrins and with HpD. These preliminary studies show great promise for PDT inasmuch as the new photosensitizers are easier to characterize and standardize than the HpD mixture. (Supported by grants from the F.M. Douglass & St. Vincent Medical Center Foundations and N.I.H. R23 CA38754-01 (MCO).)

SECTION D. MEDICAL SCIENCES
POSTER SESSION - STUDENT UNION INGMAN ROOM
SATURDAY, APRIL 26, 1986

Board J
@ 10:00 AM **Biocompatiblility of ceramic/polycarboxylic acid composites**

C.M. Fuchs, S.R. Jenei and P.K. Bajpai
University of Dayton, Dayton, OH 45469

Alumino-calcium phosphorous oxide (ALCAP), beta-tricalcium phosphate (TCP) and hydroxyapatite/polycarboxylic acid composites were implanted in experimentally traumatized femurs in rats to test the biocompatibility of the composites. All the composites were prepared by combining ceramic powder and a polycarboxylic acid in a predetermined ratio. A groove in the femoral bone was packed with the composite and saline was added as needed to moisten the powder completely. Traumatized femur grooves without the composite served as sham-operated controls. Animals implanted with TCP combined with alpha-ketoglutaric acid or malic acid were sacrificed after 7, 14 and 70 day intervals. Histology showed progressive ingrowth of bone within the implant. ALCAP or hydroxyapatite combined with either alpha-ketoglutaric or malic acid was implanted in rat femurs for 70 days. After 70 days ALCAP composites implanted in femurs were replaced with endogenous bone. Femurs implanted with hydroxyapatite composites showed growth around and adjacent to each particle. There was no difference in bone tissue response between the control animals and animals implanted with different composites. Animal studies conducted to date suggest that ceramic/polycarboxylic acid cements can be used successfully to repair bone defects.

Board K
@ 10:00 AM EFFECT OF NaF IN DRINKING WATER ON RAT DENTAL CARIES. R. Spuller*, S. Beiraghi, S. Rosen, F. Beck. Ohio State University College of Dentistry, 305 W. 12th Avenue, Columbus, Ohio 43210.

Several studies have documented the anticaries effects of fluoride when added to drinking water in rats. The majority of these investigations have utilized concentrations far in excess of current water fluoridation practices. The objective of this study was to record the caries experience of rats exposed to drinking water containing 1 to 10 ppm fluoride.
One hundred Crl: CD (SD) COBS albino rats 22 days of age were randomly divided into 5 groups and subjected to a 56 day caries test period during which they were fed diet 2000 and distilled drinking water with sodium fluoride added to provide 0,1,3,5 or 10 ppm ad libitum. Diet consumption, water consumption and weight gain were measured throughout the caries test period.
Significant caries reductions ($p < 0.05$) were recorded in all fluoride groups when compared to the 0 ppm control group. Fluoride concentrations at 10 ppm had significantly ($p < 0.05$) greater effects on caries reductions than concentrations below 5 ppm. There was no statistically significant difference in the anticaries effect of 1 ppm when compared to the caries reduction in th 5 ppm group. The results demonstrate that fluoride administered in drinking water will significantly reduce caries in rats at concentrations from 10 down to 1 ppm and that 1 ppm is just as effective as 5 ppm in its anticaries effect.

Board L
@ 10:00 AM CARIOGENICITY OF THREE FOODS IN RATS RECEIVING THEIR ESSENTIAL NUTRIENTS. S. Beiraghi*, J.L. McDonald, D.R. Avery, and B.L. Olson. Indiana University, School of Dentistry, Indianapolis, Ind.

Early animal studies evaluating the cariogenic potential of different foods invariably provided the test foods as only one component of the overall diet. Thus, the interpretation of the caries data obtained from these foods was confounded by the presence of other nutrients and food components.
In the present study, the cariogenicity of three different foods similar in texture but varying in their sucrose concentration was evaluated in rats in which essential diet was administered by gastric intubation twice daily. The test foods (Kelloggs Corn Flakes, Kelloggs Frosted Flakes, and Kroger's Vanilla Wafers) were each provided ad libitum for three groups containing 20 weanling Wistar (Harlan) rats each. The evaluation of sulcal caries was performed according to the method of Keyes. The Vanilla Wafers group containing 45% sucrose had significantly fewer carious lesions (9.4±1.4) than did the Frosted Flakes group (14.3±1.0) containing 35% sucrose ($p < 0.05$). The Corn Flakes group (12.7±0.7) containing 8% sucrose was not signi ficantly different from the other two groups in caries scores ($p > 0.05$). With regard to growth, the Vanilla Wafer group had a significantly higher weight gain than did the other two groups during the experimental period. The results of this study indicated that cariogenic potential of foods didn't relate to the content of sucrose.

Board M
@ 10:00 AM HYPERACTIVITY AND PROCESSED SUGAR

Ashley, Monica L.
R.R. #2 Box 29
Wellston, Ohio 45692

Purpose: To determine if a relationship between the intake of processed sugar and hyperactive behavior exists.
Experimental Program: I used my brother, who had been previously diagnosed as hyperactive by our physician, in the following manner: (1) I observed his behavior for two weeks during which time his diet was uncontrolled; (2) I observed him for two weeks during which time all processed sugar was elimanted from his diet; (3) I observed his behavior for one additional week during which time processed sugar had been re-introduced into his diet.
Expected Experimental Results: I expected a direct relatio ship between my brother's intake of processed sugar and his hyperactive behavior.

Actual Experimental Results: My observations confirmed my expected (theoretical) results: a direct link between his intake of processed sugar and hyperactive behavior. Proposed Further Experimentation: I propose to repeat the series of experiments and observations for a longer period of time to see if my brother's hyperactivity can be stimulated by the intake of varying amounts of processed sugar or controlled by limiting the amount of processed sugar he consumes. I also plan to do more reading and library research into the role that sugar plays in the biochemistry of the body to help me understand my observations.

Board N
@ 10:00 AM CGF/oncogene, TNF/cacechtin and ODC mechanistically describe the transformation phenotype. G.S. Bambeck Ph. D. and R.M. Gesinski Ph. D. KSU Dept. BSCI Canton, Ohio 44720

Five years ago, we reported that transformation induced primary metabolic alterations forcing the cell to become entrenched in a fixed state of forced growth and division. Our initial hypothesis is entirely supported by recent discoveries of the mechanisms of the Cell Growth Factor (CGF)/oncogene cascades, Tumor Necrosis Factor (TNF)/cacechtin and Ornithine Decarboxylase (ODC) anabolic cascade. CGF directly stimulates the glycolytic/mitochondrial ATP production ratio via glycolytic enhancement and also directly stimulates ODC.TNF inhibits lipid anabolism directed by ODC.

Inhibition of glycolysis by 5-thio-D-glucose in hypoxic tumors kills cancer cells while sparing normal cells. Inhibition of mitochondrial ox-phos with Rhodamine 123 or tetraphenyl phosphonium also kills cancer cells. Inhibition of ODC by alpha-dimethylornithine stops cell synthesis, reverses transformation and initiates differentiation. Retinoic acid inhibition of putresceine, the primary ODC product, gives results similar to alpha-dimethylornithine. TNF/cacech tin reverses anabolic lipid mobilization far downstream of ODC and apparently kills cancer cells by rendering the cell incapable of forming membranes while under ODC stimulated anabolism.

These data demonstrate full systematic logical closure. Thus, transformation can be described as a disease of metabolic control systems ammenable to chemotherapeutic attack.

Board O
@ 10:00 AM TESTING CONDITIONS MODIFY THE FEEDING RESPONSE OF RATS TO NOREPINEPHRINE INFUSION IN THE PARAVENTRICULAR NUCLEUS

C. J. V. Smith and G. L. Bidinger
The Department of Biology
The University of Toledo, Toledo, OH 43606

Norepinephrine (NE) infused into the paraventricular nucleus (PVN) of rats on a standard feeding schedule reliably induces feeding. We examined the feeding response of rats, maintained on several different feeding regimens, to infusion of NE into the PVN. Animals were subjected to a 12:12 light cycle and trained to bar-press for food. The feeder was operational for a four hour period during the middle of either the light or dark portion of the light cycle. A small lamp above the feeder indicated when the feeder was active. NE infusion had little effect on bar-pressing when administered two hours prior to the normal feeding period. A response to NE was obtained when the infusion occurred two hours into the feeding period. If the feeder was activated the animals did respond to NE when administered two hours prior to the regular feeding time. No drug effect was observed when the feeder and light were turned off after an infusion during the normal feeding period. The results indicated that the feeding response of rats to NE can be significantly influenced by test conditions.

Board P
@ 10:00 AM INSULIN mRNA IN RAT RETINAL GLIAL CELLS. A. Das, G. C. Budd, B. Pansky, B. Cordell and C. R. Kollarits, Depts. of Physiology & Anatomy Medical College of Ohio, Toledo, OH 43699 and California Biotechnology, Inc., Palo Alto, CA 94303.

We recently reported the presence of insulin-like immunoreactivity in glial cells of mouse and human retina (Curr. Eye Res. 3(12):1397, 1984). To determine whether this insulin-like activity is due to local synthesis of the peptide, the in situ DNA-RNA hybridization technique was applied to adult rat retinal glial cells in culture. Retinal cells grown in Dulbecco's MEM (with 20% fetal bovine serum and antibiotics at 37°C in 5% CO_2 for 8 days) were subcultured once and reacted with antisera to S-100 protein (peroxidase-antiperoxidase staining method). The cells were shown by this method to be glia. The same cells also showed intense cytoplasmic immunocytochemical reaction with antisera to insulin. Cultured retinal cells were hybridized with ^{3}H-labeled rat insulin cDNA at 20°C for 18 hr., covered with autoradiographic film and developed after 14 days. A high concentration of silver grains over the cytoplasm of each cultured cell indicated hybridization of labeled cDNA with insulin-specific intracellular mRNA. It appears that retinal glial cells in culture contain the mRNA necessary for de novo synthesis of insulin or a homologous peptide. The possible role of this peptide in diabetic retinopathy and in retinoblastoma is now under investigation. Supported by NIH grant #AM33761.

Board Q
@ 10:00 AM **OHIO CANCER MORTALITY RATES AND TRENDS, 1950-1984.** John Paulson and Michael Berry, Div of Epidemiology, Ohio Dept of Health, P.O. Box 118, Columbus, Ohio, 43266-0118.

A total of 486,439 Ohioans died of cancer from 1950 through 1979. Ohio age-adjusted mortality rates during the 1950's, 1960's and 1970's for white males, white females, non-white males and non-white females are presented for the 12 most frequent anatomical sites: lung, intestine, breast, stomach, prostate, pancreas, leukemia, rectum, ovary, bladder, cervix uteri and liver.
During the recent period 1979-1984, 128,450 Ohioans died of cancer. The anatomical site frequency by sex and age grouping is presented in graphical form.
Ohio county age-adjusted mortality rates are determined for the 12 anatomical sites for 1979-1984. The relationship between the 88 county rates and census-derived county-level socio-economic variables is quantified via the calculation of correlation coefficients (for the 12 sites).
Changing relationships over time between socio-economic status and: 1. cervix uteri cancer mortality, and 2. pancreas cancer mortality is examined. These sites are chosen to represent cancer types which are: 1. very treatable and 2. not very treatable. Correlation coefficients between the mortality rates (1950's, 1960's, and 1970's) and socio-economic variables (from 1950, 1960, and 1970 Census) are presented.

Board R
@ 10:00 AM EFFECTS OF TERBUTALINE ON THE PHENYTOIN EXPOSED CD-1 MOUSE FETUS. J.V.Alvarez, R.B.Paulson, G.W. Paulson, T.G.Hayes, F.M.Beck and D.Christenson. The Ohio State University, 305 W. 12th Ave., Columbus, Ohio

The teratogenic effect of Phenytoin (PH) in the mouse model may be mediated through depression of the cardio-respiratory function of the dam resulting in a decreased amount of oxygen reaching the fetus. The objective of this experiment was to determine if Terbutaline (T), which causes bronchodilation, may have an ameliorating effect on the teratogenic outcome of the PH exposed mouse fetus.

Thirty CD-1 dams were randomly assigned to three experimental groups, and were intubated at 8AM and 4PM on days 8-13 with either 8.5mg/kg PH, or 2.1mg/kg of T, or the above doses of T and PH(T + PH), with T given 15 minutes after PH. Adequate controls were maintained. Dams were sacrificed at 8AM on the 17th day; fetuses were removed by laparotomy, weighed and examined for external malformations and fixed in formalin for examination by Wilson's method. Fetal weights and the incidence of malformations were statistically analyzed using ANOVA and Chi-square analysis.

The T + PH group showed decreased fetal weights ($p < .01$) and a decrease in the incidence of malformations and hemorrhages ($p < .05$) compared to the T or PH treatment groups alone. The results remain inconclusive regarding the possible ameliorating effect of T in the PH exposed mouse fetus.

Board S
@ 10:00 AM SODIUM VALPROATE EFFECTS NEURAL TUBE CLOSURE IN CD-MICE. D.L.Crowe, R.B.Paulson, A.J.Leonardi and F.M.Beck. The Ohio State University, College of Dentistry, 305 W. 12th Ave., Columbus, Ohio 43210

Maternal administration of the anticonvulsant sodium valproate has been implicated in neural tube defects in both human and animal models. The purpose of this study was to determine the effect of maternal valproate administration on the morphology of neural tube closure in the mouse embryo, utilizing the scanning electron microscope (SEM). One hundred virgin CD-1 mice, were bred with male CD-1 mice for a period of two hours. Pregnant females were placed into experimental and control groups of ten mice each. The experimental group received 560mg/kg doses of sodium valproate by gastric intubation at gestational ages 7d 8h, 8d 0h, 8d 4h, 8d 8h, the embryonic period of neurulation. The control group received the vehicle only. Mice were sacrificed at gestational age 9d 4h; conceptuses were removed by laparotomy and fixed in 0.1 M phosphate buffered 2.5% glutaraldehyde. Embryos were dissected and specimens were routinely prepared for SEM study. Measurements were taken from SEM photomicrographs. Among 78 embryos in the treatment group, the mean neural tube opening was 67.5±7.64 μm (±S.E.), compared to 27.0±2.94 μm in the control group (84 embryos). The amount

of neural tube opening was statistically evaluated using the Mann-Whitney-Wilcoxon test, and the results proved significant ($p < .001$). These results indicate that sodium valproate significantly delays closure of the neural tube in the CD-1 mouse embryo.

SECTION E. PHYSICS AND ASTRONOMY
MORNING SESSION - ENGINEERING SCIENCE 2046
SATURDAY, APRIL 26 1986
W. WILLIAMSON, JR., PRESIDING

9:00 ATTENUATED TOTAL REFLECTANCE (ATR) OF SILVER/DIELECTRIC/SILVER LAYERS. Laura A. VanWormer, Department of Physics and Astronomy, The University of Toledo, Toledo, Ohio 43606.

ATR with prism coupling to alternate layers consisting of a thin silver metal layer, a thin dielectric layer, and a thick silver substrate is discussed. Computer models of ATR are developed using standard electromagnetic theory. For dielectric films greater than 10,000 Å thick, surface plasmon (SP) resonances at the metal/dielectric interfaces are found. As the thickness of the dielectric is decreased, the SP normal mode splits into two resonances: the angle of excitation of one approaching and the other receding from the critical angle. This behavior resembles that found in delectric/metal/dielectric layers which generate Long Range Surface Plasmons. In contrast, the exceptionally sharp resonance near the critical angle associated with the Long Range Surface Plasmons is not observed. Comparisons between the results of the two geometries will be made.

1. J. C. Quail, J. G. Rako and H. J. Simon, "Long-Range Surface Plasmon Modes in Silver and Aluminum Films", Optics Lett. 8, 377 (1983).

9:15 OPTICAL SPECTROSCOPY OF FOUR STRANGE F+Be BINARY STAR SYSTEMS. Robert Dempsey, and Bernard W. Bopp, Department of Physics and Astronomy, The University of Toledo, Toledo, Ohio 43606.

We report the results of extensive optical spectroscopic observations of four unusual interacting binary star systems. The binaries consist of a main-sequence B-Type star with emission lines (Be), along with an evolved F-type star. In two systems the F-component is apparently a supergiant, with $R_* \sim 50\text{-}100\ R_\odot$ and $L_* \sim 10^4\ L_\odot$. [NII] emission and Na I absorption lines in the spectra of these two objects indicate that a tenuous circumstellar shell exists around the stars. Unusual mass ratios [M(secondary)/M(primary) > 1] of all four systems suggest that considerable mass transfer has occurred. Irregular velocity and intensity variations of Hα emission and He I 5875Å absorption lines may arise from turbulent motions in a disc or ring structure surrounding the hot component.

9:30 RADIAL VELOCITY MEASURES AND THE EXISTENCE OF ASTROPHYSICAL BINARIES IN LATE-TYPE DWARF STARS. Richard Meredith, Bernard W. Bopp. Dept. of Physics and Astronomy, Univ. of Toledo, Toledo, OH 43606.

Radial velocities with errors ∿1-2 km s^{-1} have been obtained for 48 dK-M stars. A comparison of these velocities with published values in Gliese's (1969) Catalog of Nearby Stars shows only two stars to be possible spectroscopic binaries with small velocity amplitudes. No short-period ($P < 10$ days) systems are found. This null result confirms and extends the work of Young, Sadjadi, and Harlan (1985, Astrophysical J., in press) who conjecture that short-period or "astrophysical" binaries cannot exist among chromospherically inactive dM stars.

9:45 ELECTRON BACKSCATTERING COEFFICIENTS FOR SURFACE FILMS. G. C. Duncan†, A. Antolak*, R. Meredith††, W. Williamson, Jr.††. †Physics and Astronomy Dept., Bowling Green State University, Bowling Green, OH 43403, *Theoretical Division, Sandia National Laboratories, Livermore, CA 94550, ††Physics and Astronomy Dept., The University of Toledo, Toledo, OH 43606.

Electron backscattering from thin surface films on bulk substrates has been calculated using the single scattering Monte Carlo method. Variation in the backscattering coefficient as a function of film thickness and substrate composition will be discussed.

10:00 ELECTRON BACKSCATTERING COEFFICIENTS FROM THIN METAL FILMS. W. Williamson, Jr.†, A. Antolak*, G. C. Duncan†† and R. Meredith. †Physics and Astronomy Dept., The Univ. of Toledo, Toledo, OH 43606, *Theoretical Division, Sandia National Laboratories, Livermore, CA 94550, ††Physics and Astronomy Dept., Bowling Green State Univ., Bowling Green, OH 43403.

Electron backscattering and transmission coefficients have been calculated using the condensed history Monte Carlo method. A study of the variation in the coefficients for various sub-step sizes for different film thicknesses will be presented for intermediate energy electrons.

10:15 THE ATTENUATION OF ELECTRONS IN BULK MEDIA. R. Meredith†, W. Williamson, Jr.†, G. C. Duncan* and A. Antolak††. †Physics and Astronomy Dept., The University of Toledo, Toledo, OH 43606, *Physics and Astronomy Dept., Bowling Green State Univ., Bowling Green, OH 43403, ††Theoretical Division, Sandia National Laboratories, Livermore, CA.

The attenuation of electrons in thick materials using Monte Carlo techniques has been studied using the single particle scattering and condensed history methods. Comparisons of backscattering coefficients calculated with the two methods for intermediate electrons will be presented.

10:30 CONTOUR CHARACTERISATION OF AGGREGATED PARTICLES. D. Dollimore, The Chemistry Department, The University of Toledo, Toledo, Ohio 43606.

A method of characterising aggregated particles in terms of their contour profiles is outlined. For Euclidean and non-Euclidean shapes, a logarithmic relationship can be developed, which extrapolates to finite values for Euclidean contours, but to infinity for non-Euclidean shapes. The slope of the relationship provides a method suitable for characterisation. It is not believed that this method is based on Fractals as certain investigators report, for some of the basic concepts of Fractal analysis are absent. The method can be applied to any particular system that can be represented by a contour representation, i.e. carbon black particles, glass beads, sandstone grains, etc. It can, however, be extended to other fields, such as the pore sizes in adsorbents, characterisation of the roughness factor in surfaces, in dealing with the shapes of molecules, and in problems concerning the nucleation of phase changes.

10:45 NEUTRINO MASS OSCILLATION

Dr. Yadollah Aliakbar, The University of Toledo, Department of Physics and Astronomy, Toledo, Ohio 43606

Based on the general calculation of the tetrad formalism in a 4-dimensional space-time, we have shown that the deviation from the Riemannian geometry to the non-Riemannian geometry depends on the torsion case.

In the absence of torsion, one is naturally confined to the Riemannian geometry, while for the nonzero torsion case, our formalism uses the Einstein-Cartan geometry which is a basis in the spinor space and is incorporated with the gauge transformation for the zero rest mass Dirac field.

After constructing the Lagrangian density of the Dirac particle in this spinor space, deriving the corresponding Heisenberg-Pauli type field equations, using V-A weak interaction model for the coupling term, and solving the Klein-Gordan equation, we obtain a nonzero oscillatory mass due to the torsion-contortion term of the field equation. This agrees, both in magnitude and range, approximately with that reported by F. Reines.* We then suggest this mass to be a fairly good candidate for the solution to the "missing mass" problem of the closed universe model in the cosmology.

*Search and Discovery, Physics Today pp. 17-19, July 1980.

1:30 SECTION BUSINESS MEETING
ENGINEERING SCIENCE 2046

SECTION F. GEOGRAPHY
MORNING SESSION - SNYDER MEMORIAL 217
SATURDAY, APRIL 26, 1986
JEFFREY J. GORDON, PRESIDING

9:00 FORTY YEARS OF SNOWFALL IN OHIO'S SNOWBELT AT CHARDON. Thomas W. Schmidlin, Geography Department, Kent State University, Kent, OH 44242.

Daily measurements of snowfall began at Chardon in 1945. This Geauga County station gave the first documentation of very heavy snowfalls in northeast Ohio and now has the longest record of snowfall within Ohio's snowbelt.

Seasonal snowfall averages 105.8 inches and has ranged from 44.9 inches to 161.5 inches. The greatest monthly total was 69.5 inches in December 1962. Annual totals fit a Gaussian frequency distribution, monthly totals generally do not. Snowfall was heavy from 1955 to 1971 but has been below the 40-year average in 10 of the past 13 winters. January snowfall has been increasing but February, March, and April totals show a downward trend. Year-to-year correlation of seasonal snowfall is 0.32.

The average date of the first and last daily snowfalls of 1 inch are November 10 and April 4. An average of 35 days per year have 1 inch or more of snowfall, eight days have 4 inches or more. The greatest 3-day snowfall of the season averages 15 inches.

The average number of days with snowcover of 1 inch or more is 83, with four inches or more is 52 days, and twelve inches or more is 11 days. A 4-inch snowcover persisted for 100 days in 1977-78. Snowdepth reached 30 inches on March 5, 1960.

Additional parameters and statistical tests are provided.

9:15 THE IMPACT OF CULTURAL FACTORS ON LABOR AVAILABILITY. Stephen S. Chang, Department of Geography, Bowling Green State University, Bowling Green, OH 43403-0217.

Hong Kong is facing a labor shortage. The ability to get enough workers is a most important concern for a manufacturer as it plays a significant role in the success or failure of the business. Proper site location can help recruitment efforts.

In selecting sites, it is not only the population concentration that matters. Cultural aspects of housing and family organization can affect the regional availability of various kinds of labor.

In areas of government-subsidized housing, there is a shortage of assembly-line workers while "home-assembly" workers are more readily available. This is a result of government housing policy which does not allow married children to reside with their parents. This in effect creates a nuclear family situation and hinders the role of the extended family.

In areas with mostly private housing, the extended family can function and a manufacturer has a better opportunity of recruiting more of their needed assembly-line workers.

Cultural factors can subtly play a crucial role in labor availability, and its recognition can give business a competitive advantage.

9:30 GEOGRAPHICAL AND SEASONAL ASPECTS OF VIOLENT CRIME: TOLEDO, OHIO 1980-1984 by Beverly Seegert, Department of Geography and Planning, The University of Toledo, Toledo, Ohio 43606.

Previous studies in biology, psychology, and geography have examined the possible relationship between seasonality and crime, more specifically the effects of heat stress that produce aggressive behavior. This poster illustrates not only the seasonal variations in violent crime frequencies in Toledo, Ohio from July, 1980 through July, 1984, but also shows how those frequencies are mediated by and spatially associated with socio-economic factors of neighborhoods.

9:45 THE ANATOMY OF COMMERCIAL ACTIVITIES OF A MEDIUM SIZE CITY IN BANGLADESH. Ashok K. Dutt, Allen G. Noble and Zeenat Hasan, Department of Geography, University of Akron, Akron, Ohio 44325.

Rajshahi, the fourth ranking urban center of Bangladesh, is the administrative headquarters as well as the leading urban center of the Rajshahi Division. It is also the seat of a university and numerous other public institutions. It is situated on the left bank of the Ganges (Padma) river. Rajshahi originated as a commercial center, particularly for the silk and indigo trade, and became prominent after the advent of the Europeans. The city extends over 5 miles in an east-west direction between the river in the south and the railway line in the north. The main business street runs in an east/west direction. The primary retail center, Shahel Bazaar, has a traditional Asian bazaar townscape and may be regarded as the counterpart of the Central Business District of the Western cities. Ribbon commercial development extends in all directions from this central bazaar. The main retail center thus takes the shape of a T extending northward and then east and west. The retail center of Rajshahi city, surveyed in the summer of 1985, comprises over 125 kinds of retail functions having over 2500 establishments of various sizes. Effort has been made to classify them and find centroids of the individual retail activities. Some retail activities are clustered while the others are scattered.

10:00 THE FUNCTIONAL CHANGE OF SMALL BUSINESS CENTERS: TESTING THE SPATIAL AND ECONOMIC ELEMENTS OF CENTRAL PLACE THEORY IN SALINE COUNTY, MISSOURI. Paul O. Umbach, Department of Geography, The University of Akron, Akron, Ohio 44325.

For more than fifty years Christaller's central place theory has been tested at various scales throughout the world. Although the theory has never been without critics, it has stimulated much additional economic and geographic research. In this paper Saline County, Missouri is found to conform with the requirements of central place theory. Temporal changes in the function of small business centers are discovered when the county is compared with previous study areas. The smallest centers have lost many or all of their central place functions since the early 1940's. A two-level urban hierarchy appears to have evolved from the former three-level system suggested by Christaller. The hamlet, formerly the smallest central place, no longer exists in Saline County, Missouri as a functional business center.

10:15 REGIONAL VARIATION IN AMISH QUILTS: LANCASTER COUNTY, PENNSYLVANIA AND HOLMES COUNTY, OHIO. Karen M. Connolly and Allen G. Noble, Department of Geography, University of Akron, Akron, Ohio 44325.

The Amish are a plain people living in isolated communities with distinctive farming practices, house types, modes of transportation, and types of clothing. Amish quilts are another unique facet of their lifestyle. They can be distinguished from the body of American patchwork quilts of the same time period. This paper examines the characteristics of Amish quilts, and the pattern differences that appear in two geographic regions: Holmes County, Ohio, and Lancaster County, Pennsylvania. These differences enable these quilts to be categorized as folk material, and as such, an important part of the material culture of the United States.

10:30 COMPARISON OVER FOURTEEN SOLAR CYCLES OF ENGLISH AND JAPANESE CYCLES IN THE PRICE OF CONSUMABLES, 1698-1857. John F. Wing, Sean E. Gleason, and Amy H. Garver, Wittenberg University, P.O. Box 720, Springfield, Ohio 45501.

Wing (1982a, 1983) found numbers/biomass of biota in English ecosystems fluctuated in unison with the 11-year solar cycle during very strong cycles (moving sunspot average >40) but not during weak cycles. The implication for pre-industrial, human society was also tested by Wing (1982b) using Thomas' (1941) detrended Swedish harvest index for 1736-1913: it gave significant positive correlations ($r = .29$ to $r = .60$) during periods of active solar cycles but negative correlations ($r = -.29$ to $-.33$) during periods of weak cycles. Analysis of the detrended English price of consumables (Brown & Hopkins, 1956)

further confirms this: correlations during periods of active cycles were r = .18 to .59 but during weak cycles they were r = -.30 to -.32. The analysis of a detrended Japanese series (Yamamura, 1971) yielded r = .15 to .54 and r =-.01 to -.28, respectively, for active and inactive periods. Correlations for most periods were significant ($p<.05$), but the pattern is the most important finding.

10:45 ECONOMIC TELECONNECTIONS: CLIMATE-INDUCED CORRELATIONS BETWEEN THE PRICE OF CONSUMABLES IN ENGLAND AND JAPAN, 1698-1857. John F. Wing, Amy H. Garver and Sean E. Gleason, Wittenberg University, P.O. Box 720, Springfield, OH 45501.

A comparison is made of the detrended English (Brown & Hopkins, 1956) and Japanese (Yamamura, 1971) price of consumables. The (incomplete) series of Japanese price residuals anticipated England's (complete) series by two years (r = .190, n = 86, $p<.05$) or three years (r = .246, n = 85, $p<.025$) as would be expected since Tokyo temperature anticipated England's by two years (r = .243, n = 75, $p<.025$) or three years (r = .352, n = 75, $p<.01$) and Tokyo precipitation anticipated England's by two years (r = .177, n = 99, $p<.05$). Such climatic (and economic) teleconnections are to be expected since both England's and Japan's climates are dominated by the zonal westerlies (Lamb, 1977) and, in fact, Tokyo precipitation is significantly correlated with the zonal circulation index (Trenkle, 1956) even when measured over Europe. Solar control over the westerlies is suggested as the main mechanism behind the teleconnections.

SECTION F. GEOGRAPHY
AFTERNOON SESSION - SNYDER MEMORIAL 217
SATURDAY, APRIL 26, 1986
MOHAN SHRESTHA, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 CHANGES IN COMMODITY MIX SHIPPED FROM OHIO'S GREAT LAKES PORTS - TOLEDO, OHIO, 1973-1983. Jerry E. Green and Ann Perry. Department of Geography, Miami University, Oxford, Ohio, 45056.

The completion of the St. Lawrence Seaway in 1959 signalled a major change in water-bourne commerce for the Great Lakes ports. However, the design dimensions of the Seaway have, in the 1980's, begun to influence the amount of saltwater shipping from the Great Lakes. Ship sizes have increased, and the Seaway's current 26 foot draft has presented limits to navigation. The fluctuating dollar, and European Community agricultural policies, have also affected Great Lakes/St. Lawrence shipping. Using Toledo's four main trade commodities as a case study, changes in commodity shipping from 1973 to 1983 will be examined. These changes are assumed to partially reflect the overall change in shipping on the Great Lakes/St. Lawrence Seaway route.

2:15 THE KARTVELIAN PEOPLES OF THE SOVIET UNION. Jordan A. Hodgkins and Clyde I. Smith. Dept. of Geography, McGilvrey Hall, Kent, OH 44242.

The intent of this paper is to discuss the origins, formation and present demographic conditions of those peoples known as Kartvelians or inhabitants of Sakartvelo the present day Georgian S.S.R. Kartvelian languages comprise a subgroup of the Caucasian or Japhetic language family. These languages are distinctly individual and unrelated in structure to any other language with the possible exception of the Basque language of Spain. Two subgroups compose the Kartvelian Group of languages, the Western Kartvelian Peoples including the Megrelians, Chany and Svans: the Southern or Georgian subgroup includes 15 peoples among the large Kartvelian tribe from which the common name is derived. Known since the time of Jason and the Argonots, these people have maintained their identity against incursions by Romans, Arabs, Turks, Persians, and Russians. While most Kartvelians live with their own Soviet established republic, some are scattered throughout Russia, others live in tribal lands in Turkey or are found in Iran. Since the census of 1926, the Kartvelian Peoples have increased in number by 50.9 percent or from 1.8 million to 3.6 million. Strong supporters of the Communist government, their republic has the highest party membership of any of the 15 Soviet Republics.

2:30 SPATIAL INTEGRATION OF SOUTH SLAVS IN THE CLEVELAND SMSA. Vera K. Pavlakovic and Richard W. Janson, Kent State University, Kent, Ohio 44242.

Spatial integration of an immigrant group with the mainstream of the host population is best expressed through the quantification of a fundamental human need - housing. This paper suggests a modification of the Lieberson index of residential segregation and its application as a crude measure of immigrants' spatial integration. Using the data on South Slavs in the Cleveland SMSA, several hypotheses pertaining to the inter-ethnic and intergenerational differences will be tested.

3:00 ELEVATED CORN CRIBS AND RELATED SCALE HOUSES OF THE SCIOTO RIVER VALLEY, OHIO. R. Brett Johnston, University of Akron, Akron, Ohio 44325.

Several curious drive-in, double corn crib structures are located on the floodplain of the Scioto River in south-central Ohio. These structures are unusual in that they are elevated, either wholly or partially, up to six and one-half feet from the ground. In appreciation of their obsolescence and gradual disappearance from the cultural landscape, these large capacity cribs are described in detail, taking into account their functions within the flourishing agricultural activity of the area during the late 19th and early 20th centuries. Scale houses also were encountered in functional juxtaposition with these corn cribs. These are also described.

3:15 ENVIRONMENTAL AND ECONOMIC FACTORS IN THE GROWTH AND DEVELOPMENT OF THE LOWER SCIOTO RIVER VALLEY. Jane Maran, Department of Geography, The University of Akron, Akron, Ohio 44325.

A descriptive study was made of selected floodplain features of the Scioto River Basin of Ohio in Pickaway, Ross and Pike Counties. These features include topography, precipitation, drainage, flow characteristics, flood frequency, and floodplain management. Uses of the river and related transportation systems are discussed. The data were collected from federal, state and municipal published reports dating to 1913, local historical society publications and records, and personal interviews. This study is part of a larger work which posited a correlation between the environment of the floodplain and the presence of elevated corn cribs.

3:30 THE RISE AND DEMISE OF ELEVATED CORNCRIBS IN PIKE COUNTY, OHIO. Jane L. Craig, University of Akron, Akron, Ohio 44325.

The collection of unique farm structures on the Scioto River floodplain is a reflection of the commercial corn growing economy of the late 19th and early 20th centuries. The buildings, used for the processing, drying and storage of unshelled corn prior to shipment, came about as a result of the large corn yield of the valley. Even as these structures were being built to store this bounty, they were party to their own obsolescence. This paper addresses the effect of technology on these structures and how improvements in harvesting methods sounded the death knell for a rural architectural structure unlike those found in other parts of the country.

3:45 THE DISAPPEARANCE OF AGRICULTURAL STRUCTURES IN PIKE COUNTY, OHIO. Deborah Phillips King, University of Akron, Akron, Ohio 44325.

Taking advantage of advancing technology, today's farms function by maximizing mechanization and subsequently increasing production. Farm structures which have fallen into disrepair or which cannot be adapted for reuse are often destroyed. As a result, relic features on the agricultural landscape are disappearing at both the hand of time and modernization. This paper examines the rate and pattern of disappearance of agricultural structures such as barns, corn cribs, and scale houses in Pike County, Ohio. Utilizing maps dating from the early 1900s, and later maps and aerial photographs, historic structures have been located, and a relative rate of disappearance determined.

4:00 A GEOGRAPHIC VIEW OF ADOLESCENT STRESS WITHIN A MIDWESTERN CITY Flora E. Tramer Dept. of Geography & Planning, U. of Toledo, 2801 W. Bancroft, Toledo, Ohio 43606

Adolescent stress is of increasing concern as the teenage suicide rate rises, and drug and alcohol abuse increase, resulting in injury and premature death. Adolescent stressors were examined to determine if there was variation in the occurrence and importance of stressors among population subgroups reflecting different cultural and environmental locations throughout the city. This information is needed to develop effective intervention programs which may need to be tailored to geographic areas. Schools, therefore, were selected in zones ranging from inner city out to suburban and rural locations. This study was undertaken to determine which stressors were common to most adolescents and which were important to subpopulations. A cross-section of ten schools in a midwestern city was utilized based on location, socio-economic background and race. The total sample included 1234 students in grades 7-12. A life events instrument, the Youth Adaptation Rating Scale, was administered to assess which stressful events had occurred to students and student perception of the impact of these events.

4:15 ALLEYS IN THE CITY OF BOWLING GREEN, OHIO: A GEOGRAPHICAL PERSPECTIVE. Rajkumar Navaratnam, Bowling Green State University, Bowling Green, OH 43403

Little scholarly research has been devoted to alleys per se. Studies of city morphology and structure often appear to take the existence of alleys for granted. The few published studies related to alleys dwell mainly on problems of alley-housing rather than on their structures, patterns, or uses. Public attention appears to focus on alleys only at times of petition for their vacation. This research project examined the current functions of the alleys in the city of Bowling Green and systematically recorded each alley according to its location, structure, and status. A complete mapping and classification of alleys was performed to enable the interpretation of their different forms and present uses. In essence, this study represents a historico-cultural geographic approach to the study of a specific component of a city's structure that was felt to deserve greater attention.

4:30 PERIODIC FLEA MARKETS IN THE NORTH-EASTERN U.S.: AN EXAMINATION OF VENDOR RENT STRUCTURE. Jeffrey J. Gordon, Bowling Green State University, Bowling Green, OH 43403

Periodic markets of any kind in advanced exchange economies, such as the U.S., have been little studied by scholars. The focus of this research project was to investigate the magnitude of the rent paid by vendors to set up and sell their merchandise per day at periodic flea markets. Three aspects were examined: 1. An overview of the rents paid for the three different flea market settings (i.e. indoor, outdoor, and indoor/outdoor) was analyzed to determine the range and nature of the rent structure operating within these periodic flea markets. 2. A general comparison of all periodic flea market rent data was constructed to see if, and to what degree, rents vary from the indoor to the outdoor setting. 3. A narrow and directly controlled comparison of indoor rents to outdoor rents was conducted by examining only those periodic flea markets of the indoor/outdoor type. This examination enabled the comparison to be contained within a single set of periodic flea markets yielding both indoor and outdoor rent data.

SECTION G. CHEMISTRY
MORNING SESSION - BOWMAN ODDY 2043
SATURDAY, APRIL 26, 1986
BERND WENCLAWIAK, PRESIDING

9:00 CRYSTAL STRUCTURE OF DIMETHYLDITHIOPHOSPHINATO CHROMIUM(III). Tione Buranda and A. Alan Pinkerton, Department of Chemistry, The University of Toledo, Toledo, Ohio 43606.

Spectroscopic studies of dithiophosphinate ($R_2PS_2^-$) complexes of Cr(III) suggest that the octahedral CrS_6 chromophore is trigonally distorted (1). This is in agreement with predictions from ligand-ligand repulsion calculations (2). However, no structural data exist in the literature to confirm this hypothesis and prediction. We have, thus, undertaken the determination of the crystal structures of this type of molecule and report the first results here. Crystals of $Cr(S_2PMe_2)_3$ were obtained by sublimation and the structure solved by conventional Patterson and Fourier techniques. Currently, the structure has been refined to R = 0.032 without inclusion of hydrogen atoms. The molecule has twofold crystallographic symmetry. The crystallographic results will be compared to the hypothesis and prediction above.

(1) Cavell, R.G., Byers, W., and Day, D., Inorg. Chem., 1971, 10, 2710-2715.

(2) Avdeef, A. and Fackler, J.P., Inorg. Chem., 1971, 14, 2002.

9:15 TOWARDS THE TOTAL SYNTHESIS OF SUGARS AND SUGAR DERIVATIVES. Michael B. East and David J. Ager, Department of Chemistry, The University of Toledo, 2801 W. Bancroft St., Toledo, Ohio 43606.

The methodology for the synthesis of ribose from an achiral precursor (furan) will be described. The approach has been developed around the stereo- and regiochemical control, which is possible in a 7-oxabicyclo[2.2.1]heptenyl system. Examples of modifications to the strategy will be described, which allow a wide variety of analogues to be prepared. We suggest this route will enhance greatly the chiral pool as all positions in the 7-oxabicyclo[2.2.1]heptane may be regio- and stereoselectively substituted.

9:30 KINETIC PARAMETERS FROM THERMOGRAVIMETRIC DATA. A.S. Bhatti, Mahra Al-Marzooqi and D. Dollimore Department of Chemistry, The University of Toledo, Toledo, Ohio 43606.

Kinetic parameters can be calculated from any system subjected to a rising temperature regime with a saving in time over the more orthodox methods. The use of differential thermal analysis (DTA) and thermogravimetric analysis (TGA) methods for this purpose can be suitably illustrated by reference to polymer systems. Basically, the method involves the use of the rate equation, the Arrhenius equation and a mathematical expression giving the temperature regime to which the system is subjected. The analysis can be performed using the rate equation in the differential form on the integrated form. The preferred form is usually the integrated form, but the integration involves dealing with an expression which presents difficulties.

In the present study, TG was used with a variable rate method of kinetic analysis. Two samples of polystyrene were investigated using this variable heating rate method, which is based on examining the shift with heating rate of peaks in the plots of $\frac{d\alpha}{dT}$ against T, where α is the fractional change, T is the temperature. Theoretical considerations shows that peaks corresponding to independent reaction with widely differing activation energies can be resolved at some attainable heating rate. For competitive reactions, one peak or the other will dominate as the heating rate is changed.

9:45 POLLUTION - BEFORE AND AFTER EARTH DAY. Bruce V. Weidner, Chemistry Department, Miami University, Oxford, Ohio 45045.

Occasionally, looking back over a period of time we observe the changes that have taken place in our World. Just the changes of population, manufacturing, construction and travel indicate the trends of pollution in the air, land, and water. One way to measure some of these changes is by measuring the pH of natural waters as well as the pH of the precipitation via rain, snow, etc. An update of this measurement will be presented mainly from data collected in the United States and Canada. Some data of foreign countries will also be given. To date about 2800 water samples have been collected and tested and over 400 samples of precipitation mainly in Oxford, but also some during our travels. The contribution of nature itself via volcanoes and forest fires will be reviewed. A short review of before and after Earth Day - 1970 will be

presented and some methods used to try to reduce pollution and what some states are contemplating regarding pollution.

10:00 BOND LENGTHS AND ANGLES IN GLASS-FORMING SYSTEMS AS FUNCTIONS OF AB INITIO ATOMIC ORBITAL WAVE FUNCTIONS
Stephen W. Barber, Owens-Illinois, (Retired) 3806 Glendale Avenue, Toledo, OH 43614

A comprehensive theory of glass formation is required to account for the anomalous property-structure relations characteristic of glass-forming systems in general. An essential part of any such theory is a formal account of chemical bonding relating such anomalies to ab initio atomic orbitals. This presentation shows that bond lengths and angles in glass-forming systems are implicit in the relativistic atomic orbitals calculated by Waber and Cromer as these are modified by promotion energies and related potentials recently evaluated by Hinze and Jaffe.

1.J. T. Waber and D. T. Cromer, J. Chem. Phys., 42, 4116-4123, (1965).
2. J. Hinze and H.H.Jaffe, J. Am. Chem. SOC.,84, 540-546 (1962).

10:30 VAPORIZATION OF SOLID DIINDIUM TRITELLURIDE. Jimmie G. Edwards and Raman S. Srinivasa, Department of Chemistry, University of Toledo, Toledo, OH 43606.

The vaporization chemistry of $In_2Te_3(s)$ was studied by the computer-automated simultaneous Knudsen-effusion and torsion-effusion method, by high-temperature mass spectrometry, and by ancillary methods. The first absolute measurements of the vapor pressure of In_2Te_3 are reported. $In_2Te_3(s)$ vaporized incongruently in the temperature range 701-889 K and produced $Te_2(g)$ and a solid solution, (X_{In}=0.42 and X_{Te}=0.58). The standard enthalpy of the reaction at 298 K, $\Delta H°(298\ K)$ by the third-law method was 136.0 ± 0.3 kJ/mol of vapor. The above solid solution vaporized incongruently and produced InTe(s) and a vapor which consisted of $Te_2(g)$ and $In_2Te(g)$. InTe(s) vaporized congruently in the range 701-887 K and produced $Te_2(g)$ and $In_2Te(g)$; the third-law $\Delta H_v°(298\ K)$ was 201.5 ± 1.0 kJ/mol. These results were at variance with the literature on vaporization of In_2Te_3 where both congruent vaporization and incongruent vaporization to give InTe(s) are separately reported. Further, InTe(s) was reported to vaporize incongruently. These differences are discussed.

This paper is dedicated to Professor Dr. Kurt L. Komarek on the occasion of his 60th birthday.

10:45 ELECTROSYNTHESIS OF BIS(PHOSPHINE)PLATINUM(O) COMPLEXES AND REACTIVITY WITH ORGANIC SUBSTRATES. C.Eagle, J.A.Davies, D.E.Otis and V.Uma. Department of Chemistry, University of Toledo, Toledo, Ohio 43606.

The two-electron reduction of $[PtCl_2(PR_3)_2]$ in CH_3CN/C_6H_6 at a mercury pool electrode leads to the generation of bis(phosphine)platinum(O) equivalents. Trapping with acetylenes (e.g. PhC≡CPh, MeOOCC≡CCOOMe, where R=Ph) allows the synthesis of $[Pt(R'C{=}CR')(PR_3)_2]$ complexes on a preparative scale. Where R=Et, the low-valent complex reacts with $N(n\text{-}Bu)_4^+$ via a C-H activation process analogous to a Hofmann elimination and with CH_2CN via a C-C oxidative addition. Mechanistic studies point to new pathways for C-H and C-C bond activation in less reactive substrates such as arenes and alkanes.

SECTION G. CHEMISTRY
FIRST AFTERNOON SESSION - BOWMAN ODDY 2043
SATURDAY, APRIL 26, 1986
A. ALAN PINKERTON, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 SUPERCRITICAL FLUID CHROMATOGRAPHY WITH CAPILLARY AND PACKED COLUMNS (A REVIEW). B. Wenclawiak, University of Toledo, Dept. of Chemistry, 2801 W. Bancroft St., Toledo, OH, 43606

Supercritical fluid chromatography (SFC) employs a mobile phase kept under conditions above its critical temperature (T_c) and critical pressure (p_c). It is a complimentary technique to gas chromatography (GC) and high pressure liquid chromatography (HPLC) because of its physical properties. Thus SFC uses instrumentation which is deducted from either one of those. HPLC equipment is in general used for packed column SFC, while GC equipment will be used for capillary SFC. Advantages of both will be discussed. Technical problems can be a severe limitation to a technique. Some ways to overcome these problems will be shown. A comparison to GC and HPLC with respect to columns, mobile phases, and to analytes will be made.

2:30 THE ROLE OF FLOCCULANTS IN THE AGGREGATION OF CLAYS. J. Azizi and D. Dollimore, The Department of Chemistry, The University of Toledo, Toledo, Ohio 43606.

Concentrated clay suspensions remain dispersed as very stable suspensions for very long periods. In this project, kaolin is used for several reasons - one being its economic importance, another that its "winning" sometimes involves hydraulic processing with the stability of the suspension an important factor. The use of soluble flocculants is the subject of this project and an assessment of their efficiency in forming clay aggregates, which will sediment out. The role of different flocculating agents in the aggregation of kaoline is outlined. The principles governing the flocculation process and a simple method of experimentation are described. A theoretical approach based on permeability is derived and the resultant relationship applied to experimental systems. Previous studies employed modifications to the equation based on Stoke's Law relating to the fall of particles in a viscous medium. The new approach is based on the application of the Kozeny-Carmen permeability equation.

2:45 POTENTIOMETRIC MEASUREMENT OF METAL-LIGAND FORMATION CONSTANTS WITH A THIOCYANATE ION-SELECTIVE ELECTRODE. Pamela J. Hackl and Gordon A. Parker, Department of Chemistry, University of Toledo, 2801 W. Bancroft Street, Toledo, OH 43606-3399

Formation constant values for the lead thiocyanate complex as reported in the literature, generally from polarographic measurements, are divergent and frequently inaccurate due to omission of one or more solution variables, namely, temperature control, ionic strength adjustment, and neglect of competing side reactions from the presence of competing ligands and/or hydrolysis of the metal cation. In addition the mathematical procedure frequently used in these earlier studies, relying on graphical methods, is subject to increasing uncertainties in the calculation of successive formation constant values. A straight forward potentiometric procedure in which equilibrium concentrations of thiocyanate ion are measured directly using a thiocyanate ion-selective electrode is much more satisfactory. Curve-fitting techniques remove much of the uncertainty of graphical methods. Values for the stepwise formation constants of lead isothiocyanate are reported.

$$Pb^{2+} + n\ NCS^- = Pb(NCS)_n^{2-n}$$

3:00 DREYFUS POTLUCK - STRICKLIN, Rebecca Ellen Oak Hills High School, 3200 Ebenezer Road Cincinnati, Ohio 45248

"Chemical Dynamics - Investigations of Chemical Systems" was the theme for the Summer Institute on High School Chemistry supported by the National Science Foundation and The Camille and Henry Dreyfus Foundation and administered by the Woodrow Wilson NAtional Fellowship Foundation at Princeton University. Participants worked on curriculum development producing three modules that should be available at the session. Three computer disks were also developed and added to the Dreyfus Library. There will be information on the library and how it may be obtained. The main focus will be on presenting some of the demonstrations developed in the area of colors in chemical and physical changes.

3:15 THE EFFECT OF THE DIELECTRIC CONSTANT OF THE LIQUID PHASE ON THE HINDERED SETTLING OF PARTICULATE SYSTEMS. K. Brown, D. Dollimore, and R. Karimian, The Department of Chemistry, The University of Toledo, Toledo, Ohio 43606.

The sedimentation behavior of particulate materials in various liquids is reported. These included powdered alumina, limestone particles and ballotini. The average radii were determined using a calculated characterization parameter and various equations appearing in the literature. Relationships between the rate of settling and the viscosities of the liquids, and between the rate of settling and the dielectric constant are discussed. Both the relationships were logarithmic in form, i.e. plots of the log Q, against log η and of log Q against log ε were linear (where Q is the settling rate η is the coefficient of viscosity of the liquid and ε is the dielectric constant of the liquid). Suitable graphs to test the various equations put forward to describe the hindered settling behavior are shown. The incorporation of the dielectric constant effect into these hindered settling relationships is considered and shown to account for the observed effects.

3:30 LIQUID CHROMATOGRAPHIC INVESTIGATION OF PARAMETERS,WHICH INFLUENCE THE RETENTION OF CR-BETA-DIKETONATES. P.Schultze and B.Wenclawiak, University of Toledo, Dept. of Chemistry, 2801 W.Bancroft St., Toledo, OH, 43606

Chromium(III) forms complexes with bidentate ligands such as beta-diketones and with an octahedral coordination sphere. In case of unsymmetrical ligands two geometrical isomers (mer and fac) can be separated by liquid chromatography. We have investigated the retention behavior of 2,2,7-trimethyloctane-3,5-dione (Htod), 6-methylheptane-2,4-dione (Hmhd), 2-methylnonane-3,5-dione (Hmnd), 2,2,6,6-tetramethylheptane-3,5-dione (Hthd), pentane-2,4-dione (Hacac) coordinated to Chromium(III) by liquid chromatography. Polar silicagel and unpolar octadecyl (C18) bonded phases have been used for the separations. The retention behavior of the chelates on both phases showed some interesting differences, which can be explained by differences in the separation processes.

3:45 POLAROGRAPHIC BEHAVIOR OF SULFIDE AND POLYSULFIDE. Z. UDDIN. Baldwin-Wallace College, Department of Chemistry, Berea, Ohio 44017

Sulfide is determined at a dropping mercury electrode (DME) in alkaline media on the basis of the anodic current from the reaction

$$Hg + S^{2-} \rightarrow HgS(s) + 2e$$

Polysulfide yields an anodic wave as well as a cathodic wave corresponding to the reaction

$$S_x^{2-} + 2(x-1)e \rightarrow xS^{2-}$$

The quality of the cathodic wave is improved by the presence of a mixture of sodium ascorbate and sodium salicylate which also functions to remove traces of dissolved O_2. The sampled DC and pulsed polarographic responses are described for use of the DME in a stationary solution of rather large volume (25-50 mL). Results are also given for the application of pulsed polarographic amperometry at the DME in a flow-through cell for automatic detection of S^{2-} and S_x^{2-} by the technique of flow injection analysis.

4:00 THERMAL ANALYSIS STUDIES ON OXALATE PREPARATIONS CONTAINING TUNGSTEN. A.S. Bhatti, M.I. Diaz-Guemes and D. Dollimore.

The thermal decomposition of tungsten oxalates leads to the formation of a lemon-yellow oxide of tungsten. The study involved the use of thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), fourier transform infrared spectroscopy (FTIR) and X-ray powder diffraction. The lemon-yellow product from thermal decomposition of all these products was WO_3. This can be compared with the oxide formed from similar studies on molybdenum oxalates. Here, the oxide formed was blue. The MoO_3 is described and identified as a white powder. The blue oxide is variously described as a slightly reduced form of MoO_3, resulting in non-stoichiometry or due to the existence of mixed valency states for molybdenum in the oxide. (i.e., Mo(V) and Mo(VI)) without a change of structure. In some citations, it is given a formula Mo_3O_8 (i.e. $3MoO_3 - O$). In the case of the tungsten oxides, a blue oxide is also reported, but it is given a formula W_2O_5 (i.e., $2WO_3 - O$).

4:15 THE ISOMOLECULAR EXCHANGE REACTION BETWEEN DIINDIUM SULFIDE AND DIGALLIUM SULFIDE. Pannee Mukdeeprom and Jimmie C. Edwards, Department of Chemistry, University of Toledo, Toledo, Ohio 43606.

Ternary sulfide molecules with two metals outside periodic group I have not been observed. The molecule InGaO is known. This study sought, found, and investigated the molecule InGaS. Thermal functions of InGaS(g) were calculated on the basis of estimated molecular parameters by statistical thermodynamic methods. Equilibria involving the molecules In_2S, Ga_2S, and InGaS, by the reaction

$$Ga_2S(g) + In_2S(g) = 2\ InGaS(g)$$

were studied in the range 1060-1350 K by the Knudsen-effusion, mass-spectrometric method. The equilibrium constant was 4 ± 1 and was independent of temperature; the standard reaction enthalpy at 298 K was 0 ± 1 kJ/mol. The standard enthalpies of formation and atomization at 298 K of InGaS(g) were 80 ± 18 kJ/mol and 710 ± 18 kJ/mol, respectively. These results and previous spectroscopic studies of the binary oxide and sulfide molecules and InGaO indicate that the molecules have a bent structure with S in the center and no bond between metals.

4:30 STUDIES ON THE DECOMPOSITION OF MAGNESIUM HYDROXIDES. A.S. Bhatti and D. Dollimore, Department of Chemistry, The University of Toledo, Ohio 43606.

On heat treatment, magnesium hydroxide decomposes to magnesium oxide. There are changes in the surface area which accompany this decomposition to indicate the production of smaller particles from the original material. It has always been thought that the thermal decomposition of $Mg(OH)_2$ which has a hexagonal lattice produces a change to the cubic lattice of MgO. The presence of lattice strain has been observed by a dilation of the unit cell of the lattice using X-ray techniques. The MgO produced were examined by differential scanning calorimetry (DSC). The results indicated two peaks: the first (an endothermic peak) occurring at 333K is assigned to the decomposition of any $Mg(OH)_2$ that had formed during its exposure to the atmosphere, the second peak (an exothermic peak) occurring at 713K and differing in sharpness from sample to sample, is thought to be due to a lattice conversion in which the MgO formed is pseudomorphic to the $Mg(OH)_2$ which at a particular temperature converts to the cubic MgO.

This provides substantial conformation of earlier electron microscope and diffraction studies on $Mg(OH)_2$.

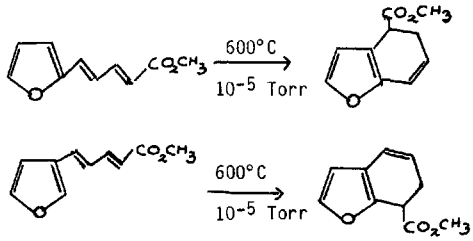
4:45 A THERMAL ANALYSIS STUDY OF THE DECOMPOSITION OF NICKEL CARBONATE AND RELATED PREPARATIONS. D. Dollimore and D. Fried, The Chemistry Department, The University of Toledo, Toledo, Ohio 43606.

A thermal analysis study on nickel carbonates is reported. These precipitates were formed by the interaction of various aqueous solutions, e.g. ammonium carbonate and nickel chloride. The precipitates varied in composition as the following parameters were changed; namely, the relative concentrations of the reactants, temperature and the method of mixing. The thermal analysis techniques allowed these changes in precipitate reactivity to be followed. The reactivity of the resultant solids could be altered by doping at the formation stage with ions of greater or less valency. A measure of the reactivity was the kinetics of decomposition. The thermal analysis techniques enable a method of kinetic analysis to be developed based on a rising temperature technique. In this instance, a simple differential method is used and this enabled comparisons to be made. A first order decay mechanism is assumed, but this is justified by previous work on carbonate decomposition.

SECTION G. CHEMISTRY
SECOND AFTERNOON SESSION - BOWMAN ODDY 2045
SATURDAY, APRIL 26, 1986
JOHN AGER, PRESIDING

2:00 DIHYDRO-AROMATIC HETEROCYCLES VIA FLASH VACUUM PYROLYSIS. C.B.W. Senanayake and T.H. Kinstle. Department of Chemistry, Bowling Green State University, Bowling Green, Ohio 43403.

As an extension of our earlier work on the flash vacuum pryolysis of benzenoid aryldienes, we have investigated the pyrolysis of a series of heterocyclic aryldiene esters, exemplified in the following reactions. We have



employed both 2- and 3-diene substituted furans, thiophenes, and pyrroles as well as 4-diene substituted pyridine. The products have been characterized by nmr and mass spectral methods. The resulting dihydrobenzoaromatics are extremely difficult to produce by alternative procedures.

2:15 YOHIMBINE: ENDOCRINE CHANGES AND INCREASE IN THE RATE OF RELEASE OF NOREPINEPHRINE AS RELATED TO THE ACTION OF THE DRUG IN THE BRAIN. Presented by: Teresa A. Eversole. College of Mt. St. Joseph, Mt. St. Joseph, OH 45051.

The effects of the drug yohimbine on the sympathetic nervous system of Sprague-Dawely rats were studied. The following conclusions were drawn. Yohimbine was found to cause a time- and dose-related increase in serum renin activity. This increase in serum renin activity appears to be related to the concentration of yohimbine in the brain rather than the serum. Yohimbine causes a time- and dose-related increase in the rate of release in the brain of norepinephrine as gauged by changes in brain MOPEG concentration. Yohimbine concentration in the brain and serum increases progressively as the dose of yohimbine is increased. However, the concentration of yohimbine in the brain is much greater than that in serum, particularly at the larger doses of yohimbine.

2:30 THE RATE OF METABOLISM OF TOLUENE IN SPRAGUE DAWLEY RATS. *Ardelia L. Young, Willie J. Washington. Angela Wilson. Department of Chemistry and Biology, Central State University, Wilberforce, Ohio 45384.

Toluene is a common component in a wide range of industrial products. Consequently, a relatively large number of people are exposed to this chemical daily. Tissue levels of Toluene using intraperitoneal (ip) injections were reported by Sato and Nakajuma 1979, but statistical tests were not performed. Blood levels of Toluene using subcutaneous (SC) injections were studied by Benignus 1981. The Median Lethal Dose (LD_{50}) 3.34ml/kg Body Weight and Maximum Tolerated Dose (MTD) 1.34ml/kg body were reported by Washington 1984. This study is designed to determine the rate of metabolism of the organic solvent toluene and its metabolites in Sprague Dawley Rats. Female and male rats 8-10 weeks will be injected with Median Lethal Dose (LD_{50}) 3.34 ml/kg body weight and Maximum Tolerated Dose (MTD) 1.34 ml/kg Body Weight. Toluene will be injected using corm oil at a vehicle. The total volume of corn-oil-Toluene mixture injected per animal will be 2.0 ml. pure corn oil will be used as the control agent. The level of Toluene present in the blood will be measured at 2,4,8 and 12 hour intervals. Toluene and its metabolites will be analyzed using Gas and Liquid Chromatography. The results of the study will provide additional information for subsequent toxicology studies. Data will be collected to determine the rate of metabolism and its metabolites and discussed at a later date.

2:45 TOWARDS THE SYNTHESIS OF THE POTENT CYTOTOXIC WARBURGANAL AND RELATED SESQUITERPENOID MOLECULES. Shyamal Parekh and David J. Ager, Department of Chemistry, The University of Toledo, 2801 W. Bancroft St., Toledo, Ohio 43606.

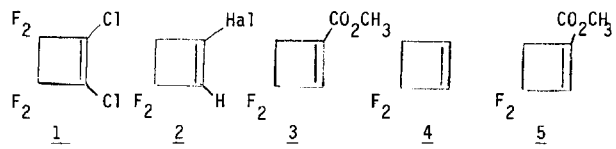
The approach we are using to synthesize the cytotoxic, warburganal, requires the introduction of two masked aldehyde moieties. The addiiton of the first aldehyde group was achieved by condensation of a trimethylsilylenol ether with phenylthiotrimethylsilylmethyl bromide to give a selectively protected β-ketoaldehyde. The second aldehyde may then be introduced by way of a formyl anion equivalent, such as 2-lithio-1,3-dithiane. In addition to the synthesis of warburganal, the scope and limitations of the method for the preparation of enedials will be discussed.

3:00 REGULATION OF HISTIDASE ACTIVITY IN PSEUDOMONAS FLUORESCENS BY ADENOSINE 5'-TRIPHOSPHATE AND INORGANIC PHOSPHATE. L. Ruess and J. K. Lutton. Department of Chemistry, Kenyon College, Gambier, Ohio 43022.

The regulation of the enzyme, histidase, which catalyzes the deamination of L-histidine to trans-urocanic acid, was investigated in Pseudomonas Fluorescens. The activity of histidase was found to be dependent on the presence of metal ions, nucleosides, nucleotides and inorganic pyrophosphate. Divalent magnesium was found to activate the enzyme, and K_m values for L-histidine in the presence of 0.33 mM and 3.3 mM $MgCl_2$ were 1.58 and 3.9 mM, respectively. Inhibition by adenosine 5'-triphosphate (ATP) was complex and a function of magnesium concentration. In the presence of 0.33 mM $MgCl_2$, both a K_m and V_{max} effect were observed. However in the presence of 3.3 mM $MgCl_2$, ATP inhibition was simple and noncompetitive with a K_I for ATP of 4.05 mM. Inorganic pyrophosphate induced sigmoidal inhibitory kinetics with the enzyme, and the K_I for pyrophosphate was estimated to be 1 mM. Guanosine 5'-triphosphate (GTP), inosine 5'-triphosphate (ITP), and uridine 5'-triphosphate (UTP) were also found to inhibit enzyme activity.

3:15 FLUORINATED CYCLOBUTENES. J.W. Jetter and T.H. Kinstle. Department of Chemistry, Bowling Green State University, Bowling Green, Ohio 43403

Perfluorocyclobutene and other highly halogenated cyclobutenes such as 1 and 2 are realtively easily available and much studied compounds.



We have recently studied Diels-Alder reactions of several fluorinated cyclobutene esters, such as 3. Lesser fluorinated cylcobutenes such as 4 and 5 present a more formidable synthetic challenge. We have evaluated several synthetic approaches to 4 which will be discussed in the oral presentation. The effect of fluorine substituents on the reactivity and stereochemistry of cycloaddition reactions of cyclobutenes will be discussed.

3:30 β-HYDROXYVINYLSILANES AS ACYL ANION EQUIVALENTS OF THE TYPE C=C-CO^-. Susan J. Mole and David J. Ager, Department of Chemistry, The University of Toledo, 2801 W. Bancroft St., Toledo, Ohio 43606.

1-Trimethylsilylalk-1-yn-3-ols, readily available by condensation of the anion derived from trimethylsilylacetylene and a carbonyl compound, have been reduced by Vitride to the trans-vinylsilane. The intermediate organoaluminium compound has been reacted with electrophiles by a variety of methods. The resultant, substituted vinylsilanes are useful synthetically, as they may be converted to substituted enones.

3:45 FUNCTIONAL GROUP TRANSFORMATIONS ON SUBSTITUTED PYRROLES. R. A. Miller and A. R. Morgan, Department of Chemistry, College of Arts and Sciences, University of Toledo, 2801 W. Bancroft Street, Toledo, Ohio 43606.

The recent discoveries that reduced porphyrins play important roles in many biological processes has led to renewed interest in the total synthesis of this class of macrocycle. Such syntheses typically rely on the preparation of suitably modified pyrroles from which the

final tetrapyrrolic macrocycle is constructed. As part of our approach to the synthesis of petroporphyrins, we required such modified pyrroles. Reported procedures for the synthesis of such compounds contain a number of drawbacks, and we have therefore developed a new synthetic route to pyrroles bearing methoxycarbonylmethyl moieties at the pyrrolic alpha position. Our experiences with functional group transformations on these pyrroles will be described.

4:00

DEVELOPMENT OF A NEW ^{13}C NMR LIBRARY SEARCH PROCEDURE
S. E. Carpenter, Malone College, 515 - 25th Street N.W., Canton, Ohio 44709
G. W. Small, Department of Chemistry, University of Iowa, Iowa City, Iowa 52242

Research concerning the development of library search procedures is aimed at improving and enhancing capabilities of existing analytical instrumentation and providing an efficient and expedient automated method for qualitative spectral interpretation. Two basic factors have complicated existing binary searches adapted for ^{13}C NMR spectral comparisons: (1) due to solvent, experimental, and structural effects, the position of a given resonance can vary; and (2) structurally similar compounds may produce spectra showing different numbers of resonances. The work presented here addresses these problems with the introduction of a new ^{13}C NMR library search program. This presentation will include a discussion of the unique features of the new algorithm and will present case study results demonstrating its capabilities.

4:30 REACTION CHEMISTRY OF PLATINUM METAL COMPLEXES WITH ACETYLIDE DIANIONS AND RELATED SYNTHONS. R. Syed and J.A. Davies, Department of Chemistry, The University of Toledo, Toledo, Ohio 43606.

The cyanide and acetylide anions, CN^- and $HC{\equiv}C^-$, are isoelectronic and well-known as terminal ligands in transition metal complexes, M-CN and M-C≡CH. Although cyanide also commonly acts as a σ,σ-bridging ligand, $[M\text{-}CN\text{-}M]^+$, analogous σ,σ-bridged complexes containing acetylide dianions, [M-C≡C-M], are very rare. We are investigating the reaction chemistry of platinum metal complexes with the acetylide dianion and related synthons. Two systems designed to produce new [M-C≡C-M] complexes will be described, i.e. the reaction of $[PtCl(CH_3)(Ph_2PCH_2CH_2PPh_2)]$ with LiC≡CLi and the reaction of $[Pt(PPh_3)_4]$ with IC≡CI. Reaction products have been characterized by FT-IR, FT-NMR, and single crystal X-ray diffraction techniques.

4:45 THE DIELS-ALDER REACTION OF SUBSTITUTED FURANS. Daniel Holsworth and David J. Ager, Department of Chemistry, The University of Toledo, 2801 W. Bancroft St., Toledo, Ohio 43606.

In our continuing studies towards the stereoselective synthesis of various substituted tetrahydrofurans by way of the 7-oxabicyclo[2.2.1]heptene system, the Diels-Alder reaction between various 2-substituted furans and unsymmetrical dienophiles have been considered. The study has been carried out with 2-phenylthiofuran, and the oxime and ethylene glycol acetal of furfuraldehyde to determine the effect of electronic effects on the regiochemistry of the condensation. The consequences of these electronic effects and the use of the adducts for the synthesis of substituted tetrahydrofurans will be discussed.

SECTION H. SCIENCE EDUCATION
FIRST MORNING SESSION - SNYDER MEMORIAL 103
SATURDAY, APRIL 26, 1986
TONI MILLER, PRESIDING

9:00 SCIENCE EDUCATION: SOME SUGGESTIONS FOR IMPROVEMENT.
Marian A. Moeckel, Edgewood High School
State Route 73
Trenton, Ohio 45067

With support from the National Science Foundation, thirty Ohio teachers were selected to participate in a three-week program entitled "Implications of Science," focusing on world energy supplies, world population problems, hazardous and toxic materials, world food supplies, and problems associated with changes in world biomes. The program was held in June, 1984, at Miami University, and was co-sponsored by Miami's Institute of Environmental Sciences and The Ohio Academy of Science.

As part of a follow-up weekend in early November of 1984, the teachers addressed topics they considered to be of major concern to science educators in the eighties. Among the topics to be discussed will be laboratory facilities and experiences, articulation, length of scheduled classes, teacher training, certification, and funding. These concerns will be discussed with time for questions and comments.

9:15 ESTABLISHING A SCIENCE RESEARCH COURSE AT THE HIGH SCHOOL LEVEL

Dori Ridgeway
208 East Maynard Avenue
Columbus, Ohio 43202

The content of this presentation will include a description of the process by which the author established a Science Research course curriculum at the High School level. The author will discuss many aspects of the process including getting cooperation from administrators, establishing an interest among students and other staff members, grant writing for equipment and services, rationale for establishing such a course, and a brief course outline.

A discussion of the course outline will include areas of research for both group and individual experimentation, the role of accessing computerized data bases and other information resources, the role of word processing and programming in BASIC and Logo, as well as the use of a wide variety of community scientific resources and resource persons.

9:30 A REPORT ON AN NSF FUNDED GRANT IN SCIENCE EDUCATION FOR NORTHWEST OHIO Dr. Evan McFee, Bowling Green State University, Bowling Green, Ohio 43403

This is a presentation to describe the implementation of a grant funded by the National Science Foundation to facilitate a science enrichment program for elementary and middle school teachers of Northwest Ohio. The first phase of the program included a summer workshop to upgrade teacher's knowledge of science content in the area of earth science, chemistry, physics, and astronomy. This phase also involved developing science teaching kits, demonstrations using inquiry, and information on computer programs in science education. A second phase involved a field-based setting to get hands-on materials in the classrooms. The last phase included spin-off workshops to involve other classroom teachers in the philosophy of hands-on methods for teaching science to children. The goals, rational, and outcomes of the program will be given during this presentation.

9:45 USING SIMULATION GAMES TO "TEACH" TECHNOLOGY. Toni L. Miller, 721 Northwood Dr., Uniontown, OH 44685

Simulation games are role-playing group activities which resemble real life. Students choose one of six different roles and do group fact finding and problem-solving. Topics are controversial issues to which there are several possible solutions and a variety of opinions. With the growing concern to include technology topics in the curriculum, simulation games offer a viable way to study technology issues.

Simulation games are an excellent way to teach higher level thinking skills such as synthesis, analysis, evaluation as well as verbal expression, group cooperation and value formation. It is an interdisciplinary approach to a complex problem; emulating reality. The experience teaches students skills which will enable them to effectively function in an increasingly more technological society.

Games designed and used by the author include "Nuclear Power Plant", "Coal-Fired Power Plant", "Nuclear War", "Acid Rain", "Toxic Waste", and

"Strategic Defense Initiative. Using the resources of the media center, students do research and have "conferences" or "town meetings" to express opinions, knowledge & priorities on set of tasks.

10:00 AN INTERDISCIPLINARY APPROACH TO TEACHING TECHNOLOGY. Toni L. Miller and Bob Bauer, Spring Hill JHS, 660 Lessig Ave. Akron, Ohio 44312

Industrial (Arts) Technology teachers are actively incorporating technology education to help fulfill a need for technological literacy and to improve enrollment. Science has also begun to focus on Science, Technology and Society, but not as actively.

The study of technology lends itself to an interdisciplinary approach (i.e., a blend of Math, Science, traditional Industrial Arts, Language Arts, Social Studies and Computer Literacy)to present a history of man's use of tools for the solution to problems of society.

The resources of an Industrial (Arts) Technology teacher and a science teacher have been combined to develop a philosophy and curriculum materials in order to "team teach" technology topics. Hands-on activities, simulation games and a variety of traditional methods are used to develop an appreciation for, an historical perspective of and values on issues related to technology. This multi-faceted approach is designed to maximize learning, thinking and decision-making skills, and to enable students to better cope with thier technological society now and in the future.

10:15 A SCIENCE CENTERED CURRICULUM AND LEARNING AGENDA FOR A GLOBAL LEARNING SOCIETY Stephen W. Barber, Owens-Illinois,(Retired) 3806 Glendale Avenue, Toledo, OH 43614

The National Commission on Excellence in Education, in A NATION AT RISK, proposes reform to "focus on the goal of creating a Learning Society." -- a noble sentiment favored by Jefferson and Franklin and scientists in general; but unrelated to the real although misconceived need. A learming society better than any yet conceived by a national commission already exists and has had dominant influence in world history for more than a century. The need in public education is not to create a learning society but to teach participation in one supremely qualified already extant. A curriculum and student learning agenda to meet this need is here proposed.

This proposal is to shift science, our optimum learning discipline,to the center of our public school curriculum where, by its methods, it can optimize all less general categories of learning; i.e., the other humanities. SCIENCE is a global community of scholars with an immense global literature. Literacy in it can enrich the lives of global as well as national populations. How tragic that even commissions on excellence in education remain unaware or unappreciative of it while prescience confusion and misunderstanding threaten to destroy all excellence and all meaning!

10:30 INDIVIDUALIZING INSTRUCTION IN SCIENCE HINTON, Nadine K., Graduate Student, Dept. of Psychology, The Ohio State University, 1885 Neil Ave. Mall, Columbus, Ohio 43210

Two methods for designing individualized science units will be presented. First is an organizational tool for the teacher to use in considering all aspects of an original unit (different reading levels; use of media; resource persons; etc.). Second, by teaching students to generate and to answer their own questions at each level of Bloom's Taxonomy, each student can complete a unique project at his/her own level and area of interest. While the examples given in this presentation will be from middle school science units, these programs can be modified easily for use in interdisciplinary units, in other content areas, or at different grade levels. These methods have been used successfully for several years at West Muskingum Middle School.

10:45 INTERACTIONS OF COMPUTER ATTITUDES, TEST ANXIETY, AND PERSONAL CHARACTERISTICS IN A COURSE REQUIRING COMPUTER TESTING. Loretta F. Beal, Computer Based Education and John F. Gwinn, Biology Department, University of Akron, Akron, Ohio 44325.

As the use of computer testing becomes more extensive, it is important to determine how computers affect student performance and attitudes. Audio-tutorial anatomy and physiology (ATAP) is a two-semester, self-paced laboratory course that administers weekly on-line computer tests to over 500 students. Scores from these tests comprise a significant portion of the course grade. Questionnaires were given at the beginning, middle, and end of the year which included: personal data, previous computer experience, attitudes toward computers, and general test anxiety. It was found that after a semester's experience with computer testing, general test anxiety increased slightly, but computer attitudes became more realistic. Regarding debilitating/facilitating anxiety, students reported that computer administered tests produced more debilitating anxiety and less facilitating anxiety while paper and pencil tests engendered more facilitating and less debilitating anxiety. In spite of this, the students strongly preferred computer testing. Given these findings, it would appear that careful attention should be given to the specific details of the computer testing format and the manner in which it is integrated into the course.

SECTION H. SCIENCE EDUCATION
SECOND MORNING SESSION - SNYDER MEMORIAL 132
SATURDAY, APRIL 26, 1986
MARIAN A. MOECKEL, PRESIDING

9:00 GUIDELINES FOR CONDUCTING A SUCCESSFUL SCIENCE FAIR - STRICKLIN, Rebecca Ellen Oak Hills High School, 3200 Ebenezer Road Cincinnati, Ohio 45248

Science Projects can be excellent tools for students to learn by discovery about a concept, law, or process but only if the students do the work themselves and under guidelines to maximize the learning process. Help is available through the Academy and from other teachers to assist your students with their projects and to help you if you want to put on a science fair.

9:30 INLAND MARINE SCIENCE FOR SCIENCE TEACHER ENHANCEMENT. Cynthia S. Groat, Dept. of Biological Sciences, Bowling Green State Univ., Bowling Green, OH 43403, and Suzanne B. Rock, Bowling Green Senior High School, Bowling Green, OH 43402.

The Year of the Ocean focused public awareness about our largest resource. Inland residents are affected by the ocean's impact on weather, economy, food, politics, etc., and disadvantaged by lack of direct access and few school curricula. Marine science study is very important to inland students and can also integrate numerous science disciplines. Furthermore, the current nationwide attention on the critical shortage of qualified science teachers and C. Groat's own enhancement during sabbatical leave (spring 1984) both emphasized the need for increased training opportunities to update knowledge and skills of science teachers to improve the quality of science teaching. A pilot project was conducted summer 1985 on Marine Closed-System Study and Tropical Field Trip for Science Teacher Enhancement utilizing facilities in the Inland Marine Laboratory at Bowling Green State University. The teachers learned to set up and maintain salt water aquariums for the classroom. They participated in a 10-day field trip to the Florida Keys to observe marine habitats first-hand and to collect live specimens for their classroom aquariums. They incorporated new knowledge and experiences into new curriculum units. Both the teachers and their students gained increased excitement about science by "bringing the ocean into the classroom."

10:00 A SCIENCE CONCEPT APPLIED TO A PROBLEM IN SCIENCE EDUCATION. Claudia T. Melear. The Ohio State University, Ohio Sea Grant Education 059 Ramseyer, 29 W. Woodruff, Columbus, Ohio 43210

CONCEPT Interaction between constituents in/between systems is a well known phenomenon in science.In chemistry, multiple drug dosage with positive, additive interaction is usually desirable, rather than the opposite-reduction of individual

drug effects if multiple drugs are given. An interaction can, in general, give two types of results which are essentially opposite each other in effect: 1. A synergistic one - this is actually an additive effect - the result is greater than if the two drugs had simply had their individual effects added together. Example of SYNERGY: 1+1=>2. 2. An antagonistic one - in this effect the drugs counteract each other. The individual drug effects are reduced. The interaction of the drugs can actually be detrimental to the system and demise can occur. Example of ANTAGONISM: 1+1=<2. ANALOGY: Scientists and science educators know about synergism and antagonism. Yet their interactions - the interactions between scientists and science educators in the System of Science Education - rarely are synergistic. This paper suggests that if a more regular synergistic interaction rather than the opposite, could occur between these two groups in the Science Community, then the crisis that exists in Science Education could be possibly be abated.

10:30 GATLING GUNNING A NASA MISSION FOR INNER SPACE CONQUESTS. Morris L. Martin, 157 Griswold St.,P.O.Box 593,Delaware,Ohio 43015.

International, space education doors were opened for the author when he accepted the challenge of nonadmission to a NASA launch conference. His personal quest recorded the Challenger/Spacelab blast-off, gleaned unique resources, and advanced to informal meetings with the scientific delegations of Holland and Germany.

A mounted cluster of cameras, emulsions, and accessories has convinced students that unusual photographic selections produced superior, analytic images of that launch. Investigative intrigue looms from dual, sonic overlap on the author's audio tape. Scarce, scientific mementos ensnare classroom interest.

The author will show his array for rapid photography, offer technical and economic advice, and share highlights of invited participation in a press conference for Prof. Hermann Oberth: "The Father of Modern Rocketry and Space Flight". Other treasured tangibles will play roles in this presentation.

SECTION H. SCIENCE EDUCATION
FIRST AFTERNOON SESSION - SNYDER MEMORIAL 103
SATURDAY, APRIL 26, 1986
J. DAVID WHITTINGTON, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 USE OF MICROCOMPUTER SIMULATIONS OF SCIENCE ACTIVITIES TO STUDY CONCEPT DEVELOPMENT
Robert E. McNemar, Ph.D., Director of Academics Columbus Public Schools, Columbus, Ohio 43207

Educational research favors the use of mixed sequences over sequences of all positive instances in a conjunctive feature identification task. Psychological research favors sequences of all positive instances over sequences of mixed positive and negative instances.

Middle school science students were given instructions on using negative instances in a conjunctive letter string task. Students were able to use negative instances and to identify the two critical features of the microcomputer simulation of science activities.

The two sequence conditions (+ and ±) were crossed with the frequency conditions (1:1 and 9:1) to form four treatment groups. The sequences consisted of either all positive instances (+) or alternative positive and negative instances (±). The features in the irrelevant dimensions were either balanced so that each occurred about 50% of the time (1:1) or they were weighted so that one feature occurred about 90% of the time (9:1). There was significant interaction between the sequence conditions and the frequncy conditions. This interaction suggests feature frequency is a potential variable in explaining the differing results between the psychological research supporting the use of all positive instances and the educational research supporting the use of mixed positive and negative instances.

2:15 ACTIVITIES FOR TEACHING REPLICATION, TRANSCRIPTION AND TRANSLATION OF DNA.
David E. Lewis, Biology Department, Perry High School, 3737 Harsh Ave., Massillon, OH 44646

Understanding replication, transcription and translation of DNA pose unique problems to sophomore biology students. A method has been developed which uses sequential, global and KT learning modes to teach these concepts. The educational material consists of puzzle pieces with heavy emphasis on biochemistry. All of the biochemistry necessary is introduced during the lesson and the student does not have to become expert to complete the exercise. This activity also addresses point mutations, such as frameshift additions, frameshift deletions and tautomerisms. Preliminary data suggest that those concepts which are reinforced by KT activities are the easiest to understand and retain.

2:30 PRISM - Project to Redesign Instruction in Science and Math. William R. Bingle, Perry High School, 3737 Harsh Ave. S.W., Massillon, Ohio 44646

The current focus on instruction in science throughout the United States is science, technology and society (STS). This movement seeks to integrate the technological and social aspects of science. PRISM is the Stark County Local School System's approach to answering the call for increased awareness of STS. The goals of PRISM are: 1. To increase the number of students taking three or four years of science and math. 2. To increase students' math and science test scores. 3. To increase the number of students selecting science and mathematics careers. 4. To increase the general level of mathematical and scientific literacy among all students. 5. To retain science and math teachers by improving job satisfaction.

Local implementation of this four year plan began during the summer of 1985 with a three week workshop for thirty-six secondary science teachers from Stark County. Methods of implementation (including financing) will be discussed.

2:45 EFFECTS OF GROUP SIZE AND ADVANCE ORGANIZERS ON ACHIEVEMENT, RETENTION, AND RATE OF LEARNING WHILE PURSUING KINEMATICS WITH MICROCOMPUTER TUTORIALS. Dr. Ernest R. Carnes, Hudson High School, 77 N. Oviatt St., Hudson, OH 44236, Dr. Joy S. Lindbeck, Secondary Department of Education, and Dr. C. Frank Griffin Department of Physics, The University of Akron, Akron, OH 44325.

The purpose of this study was to investigate how the use of CAI tutorial programs, incorporating advance organizers, and involving various sizes of groups of subjects, would affect students' achievement scores, retention scores, and rates of learning. Used as subjects were 100 suburban high school physics students running interactive tutorial kinematics programs. Preceding each tutorial was an advance organizer for the experimental groups (N=50) and an advance non-organizer for the control group (N=50). While pursuing the tutorials the students worked individually or together in groups of two, three, or four.

Results revealed that students working in groups of three and four on CAI tutorials had significantly better rates of learning than students working alone while no significant difference due to advance organizer treatment was found.

The implications for using CAI tutorials in physics point to grouping students in fours as a time saving and economic method of presenting material without significant loss of achievement or retention.

3:00 A PROPOSAL FOR A MASTER OF ARTS IN TEACHING WITH CERTIFICATION AS ONE SOLUTION TO THE SHORTAGE OF SCIENCE AND MATHEMATICS TEACHERS.
Dr. Joy S. Lindbeck, Secondary Department of Education, The University of Akron, Akron, OH 44325

The proposed Master of Arts in Teaching with Certification is designed for college graduates with noneducation degrees who desire to prepare to teach in the secondary schools. College graduates and even a number of students with graduate degrees in mathematics and science are expressing interest in becoming certified in the State of Ohio to teach in the secondary schools. A program for the Master of Arts in Teaching with Certification would permit a challenging program and completion of the State of Ohio require-

ments to teach in the secondary schools.

To comply with the State of Ohio guidelines for 300 clock hours of field and clinical activities, field experience activities have been cited for foundation courses in philosophy and educational psychology and for secondary education courses in strategies for teaching, two seminar courses, and one field experience class. Clinical experience has been cited for the strategies for teaching course, a seminar in the improvement of instruction, a reading course, a microcomputer course, and a foundation course in educational psychology. The distribution of courses included eight hours in the Foundations area, 21 hours in the Secondary Education area, and 8 hours in the area of concentration. The science and mathematics requirements in the teaching fields must be met.

3:15 SCIENCE REQUIREMENTS FOR LIBERAL ARTS STUDENTS AT OHIO COLLEGES AND UNIVERSITIES. John F. Gwinn, Chairman Division of Natural Sciences, University of Akron, Akron, Ohio 44325.

The current enthusiasm for science education has led to demands for greater "scientific literacy" with most of the focus on quality of instruction. However, relatively little information is available regarding the quantity of science instruction, particularly at the undergraduate level. Obviously knowledge of both aspects is essential to assess the appropriateness of science education. The science requirements for liberal arts students (both science and non-science) at state universities and selected private colleges were analyzed in an attempt to assess the quantity of science instruction in Ohio. Many non-traditional and innovative approaches made precise comparisons between institutions impossible. Even so there was nearly a three-fold difference between state institutions in the required science and math credits. Also, only half of the schools required a laboratory science course. By comparison, there was less variation among the required credits for Humanities and for Social Sciences (each of which nearly always exceeded the required science credits). The results suggest that to strengthen science education in Ohio universities and colleges, the amount of time students are involved in science courses should be critically examined.

3:30 LAKE HIGH SCHOOL ARBORETUM: A LIVING LABORATORY. Nancy Martin, Vernon Veeder, Gene Ward, Lake High School, 28080 LeMoyne Road, Millbury, Ohio 43447.

The Lake High School Science Department proposed that an arboretum be considered for a District wide grant, funded by the Excellence in Education Program in Wood County. The planting of 30 species of trees was aimed primarily at the Life Science students at the Junior High and High School in their studies of taxonomy and ecology. However, art students and elementary pupils will be provided with a nearby environment for visual and nature awareness as well.

Copies of the proposal and plans for the arboretum layout will be available. Slides will be shown of trees to be included in the project.

3:45 A STUDY OF SCIENCE EDUCATORS' ATTITUDES TOWARD THE MERIT OF SCIENCE FAIRS William R. Bahr, Southwestern High School, Patriot, Ohio, 45658.

The purpose of this study was to determine the attitude of science educators toward the merit of holding science fairs. Twenty science teachers in a rural Southeastern Ohio school district participated in the study. The school district has participated in science fairs at the local, district or state levels for five years previous to the study.

The data was collected by using a Likert-type opinionnaire with a scale of seven positions on each of fifteen statements. The data from the opinionnaire was analyzed by computing the mean, median, mode and and standard deviation.

The study revealed a moderately positive attitude toward the merit of science fairs. In general the science teachers felt that science fairs do have something to offer the school curriculum.

4:00 AN EARTHWATCH RESEARCH EXPEDITION TO STUDY THE PHYSIOLOGY AND BEHAVIOR OF AUSTRALIA'S ARID ZONE KANGAROOS. Robert E. Rohrbaugh, Jackson Middle School, 7355 Mudbrook St. NW, Massillon, OH 44646

Earthwatch is a non-profit organization which acts as a clearinghouse to match people's interests with worldwide research projects that need interested people. Expeditions involve mission oriented activities with problems to solve of the most fascinating kind. On an expedition one has the unique opportunity of working side by side with professional scientists "on the front lines of inquiry", seeking solutions to unanswered questions, and cooperating to get the job done. Earthwatch participants share the work, costs, adventure and excitement of field research.

The purpose of the Kangaroo Expedition was to study: (1) the movement of individual kangaroos within and between local populations (home range); (2) short and long term social relationships between individuals; (3) energy requirements and temperature regulation in free-ranging kangaroos.

These questions were studied by first capturing individual kangaroos and then following the movements and behavior of those bearing lightweight radio transmitters that would broadcast not only their position, but also their physiological state.

Volunteers were used in all aspects of field data collection, including assisting in radio tracking, animal capture and surgery, and data logging of physiological telemetry.

SECTION H. SCIENCE EDUCATION
SECOND AFTERNOON SESSION - SNYDER MEMORIAL 205
BIOTECHNOLOGY SYMPOSIUM
SATURDAY, APRIL 26, 1986
SPENCER REAMES, PRESIDING

2:00 **A SYMPOSIUM: BIOTECHNOLOGY AND ITS IMPLICATIONS FOR EDUCATION.**
arranged by Spencer E. Reames, Benjamin Logan High School, Box 98 (Logan Co. Rd. #5), Zanesfield, Ohio. 43360

What is biotechnology? What are the implications of biotechnology for those involved in the educational process, whether that be at the secondary level or the collegiate level? At the present time, there appears to be some confusion concerning these questions. The purpose of this symposium is to address these questions.

Biotechnology, in the broadest sense, is the application of biological knowledge and, because of the breadth of the biological sciences, does not fit neatly into a single discipline. Various examples of biotechnology developments will be given by Gary Barton. A specific technique will be discussed by Douglas Foster as an example of biotechnology.

There are implications associated with biotechnology for society and for educators. Clague Hodgson will discuss some of the implications and questions which have arisen from the growth of biotechnology. John Reeve will be addressing the implications for those individuals that are involved with the education of students.

2:15 *WHAT BIOTECHNOLOGY HAS IN STORE FOR US -- AN INDUSTRY PERSPECTIVE.* Gary F. Barton, Science Communications Director, Monsanto Company, 800 North Lindbergh Blvd., St. Louis, Mo. 63167

The products of genetic engineering research can be divided into three general categories: agriculture, human health care and nutrition.

Agriculture: Scientists have made major discoveries in plant genetic engineering that may enble them to produce crop plants in the 1990s that can tolerate drought, herbicides, insects or disease.

Human Health Care: Research in this area focuses on the discovery of proteins that will provide innovative new ways to treat major diseases. Other research is aimed at discovering the processes that control cell growth and function.

Animal Health and Nutrition: A protein is expected to be commercialized in the late 1980s to increase the efficiency of milk production in dairy cows and improve feed utilization.

2:45 ISOLATION AND STRUCTURAL ORGANIZATION OF THE CHICKEN GONADOTROPHIC PITUITARY HORMONE GENES. Douglas N. Foster. Department of Poultry Science, Ohio State University/OARDC, Wooster, OH 44691.

The aim of this research project is to better understand the molecular mechanisms of how the chicken pituitary gonadotrophic hormones affect growth, reproduction, and metabolism. To this end, we are isolating and cloning the gene for the chicken growth hormone as well as the genes for the α and β subunits of LH (luteinizing hormone), FSH (follicle stimulating hormone), and TSH (thyroid stimulating hormone). We are using heterologous rat and bovine specific cDNA probes in order to isolate these sequences from a chicken genomic library and a chicken pituitary cDNA expression library.

We are characterizing the mRNA transcripts of these isolated genes to determine their size half-lives, and levels of expression upon induction during various growth states. The genomic clones will be analyzed to determine the regulatory regions specifically responsible for gene expression.

Once we have isolated and cloned the specific gonadotrophic pituitary genes, we will attempt to produce large enough amounts of these expressed and correctly post-transitionally modified proteins using an avian retroviral expression system in order to fully understand on a molecular basis the role these hormones play in the chicken.

3:15 SOCIAL AND LEGAL IMPLICATIONS OF GENETIC ENGINEERING. Clague P. Hodgson, Laboratories of Molecular and Developmental Biology, Department of Dairy Science, Ohio Agricultural Research and Development Center, Ohio State University, Wooster, Ohio 44691.

Recent developments in molecular biology, immunology, tissue culture, and embryo manipulation have significantly enhanced man's ability to change living organisms. The potential benefits to mankind have led to multibillion dollar per year investments involving over 200 new companies and many existing enterprises. Although various scientific problems involved in genetic engineering were insurmountable until relatively recently, many of these problems have now been at least partially solved. Concerns have shifted somewhat toward issues involving: 1) the legality of patenting new life forms; 2) the question of the need for regulation; 3) safety; and 4) the public perception of science. The development of a high tech industry around basic biological science has left some researchers with divided interests, and has at the same time led to useful collaboration between industry and academe. Universities will soon face new tests of the basic premise of the 'universality' of knowledge gained from research as they attempt to patent and temporarily withhold publication of proprietary discoveries made with taxpayer support.

3:45 WHERE DOES BIOTECHNOLOGY FIT IN TEACHING BIOLOGY? John N. Reeve, Chairman, Department of Microbiology, 484 W. 12th Avenue, Columbus OH. 43210.

Biotechnology, as its name implies, is the use of technology to exploit biological activities. The technologies involved range from thoroughly established, industrial processes such as fermentation (brewing, antibiotic production, waste treatment) to commercial applications of recently-developed research techniques (gene cloning, monoclonal antibodies, tissue culture). Biotechnology is therefore clearly not a scientific discipline nor even a defined group of technologies. Teaching Biotechnology as an academic subject would be very difficult and probably of limited value to students. Nevertheless the word Biotechnology is used so frequently by the Press and the concept has been lauded so highly in commercial and political arenas that students are rightly demanding an education in 'Biotechnology'. I propose that educators should respond by explaining where the basic scientific facts, taught in biology courses, are relevant to biotechnology and that this approach be used to identify and discuss real-world examples of biotechnology products and processes. This proposal will necessitate teaching molecular biology at a very early stage in a student's education; choices may have to be made between whole organism biology and subcellular topics in biology curricula.

4:15

PANEL DISCUSSION

Gary Barton, Douglas Foster, Clague Hodgson, and John Reeve will respond to questions and comments from the audience. Spencer Reames will serve as moderator.

SECTION H. SCIENCE EDUCATION
POSTER SESSION - STUDENT UNION, INGMAN ROOM
SATURDAY, APRIL 26, 1986

Board E
@ 9:00 AM SCIENCE RESOURCES FOR SCHOOLS

Walter J. Bogan, Jr.
Director, Science Resources for Schools
Office of Science and Technology Education
American Association for the Advancement of Science
1333 H Street, N.W.
Washington D.C. 20005

Report on a three-year SRS pilot effort in Ohio and other states of a program to improve science teaching in the middle grades, sponsored by the American Association for the Advancement of Science, and sponsored by SOHIO.

Science Resources for Schools (SRS) is a program of continuing professional development for teachers of science in the middle grades. The central purpose of SRS is to encourage these teachers to provide their students with experiences with natural phenomena that will foster confidence and enthusiasm in students' own ability to learn science. As a multi-dimensional, long range project of the American Association for the Advancement of Science (AAAS), SRS aims to accomplish this aim through dissemination of activity-based materials, ideas, and resources from the scientific community to teachers through networks of administrators, teacher trainers, peers, and other professionals concerned about the quality of science education.

SECTION I. ANTHROPOLOGY AND SOCIOLOGY
MORNING SESSION - SNYDER MEMORIAL 134
SATURDAY, APRIL 26, 1986
JANET MICHELLO (WOLFE), PRESIDING

8:45 OPPORTUNITY FOR PARTICIPATION IN SPORT: FROM THE ELEMENTARY TO THE HIGH SCHOOL YEARS. N. Jane McCandless, Social Science Division, The University of Pittsburgh at Bradford, Bradford, PA. 16701.

Detailed information about athletic programs across educational gradients is limited. The purpose of this study therefore was to obtain information about athletic programs offered to both males and females from the elementary through the high school years. From a questionnaire mailed to superintendents of all county and city public schools in a northwestern county of a midwestern state, the results revealed comprehensive athletic programs at the high school level. Athletic programs at the junior high school level however are limited to the most popular sports found at the high school level. And organized athletic programs at the elementary level are virtually nonexistent. Discussion then focuses upon the consequences of such divergent programs during the first twelve years of school.

9:00 DIETING AS A STATUS PASSAGE. Bohdan Chopko, Richard Mayrer, David Nowicky. 880 Simich Dr., Seven Hills, Ohio 44131

A status passage can be viewed as a marketplace: a passagee pays a price in exchange for a commodity and its associated benefits. In the case of weight-reducing diets, the commodity of reduction in body mass has a variety of associated benefits. Sixty seven diets, the majority of which represented in the mass media and designed for use by the general public, were coded with respect to the associated benefits of health, personal appearance, and social metamorphoses. Costs were coded

as to ease, control, and non-reversability; ease defined the diet's degree of difficulty, control reflected what decisions the dieter was permitted to make by the regimen concerning his or her lifestyle, and non-reversability described the risks and guarantees offered by the diet plan. Improved health and appearance were offered by the vast majority of diets examined, and other social metamorphoses to a slightly lesser extent. By cross-tabulating these benefits with the three costs as they occurred per diet, a trend was identified. Most of the diets required the dieters to relinquish the majority of control of their lifestyles to a prescribed regimen and undergo discomfort with little or no guarantee against reversability in order to move from a heavier, undesirable status to a new, lighter, and more acceptable one.

9:15 PAIN RELIEF: MORE OHIO ELDERLY ELECTING BONE REPLACEMENTS Lawrence Stochl, U.S. General Accounting Office, Room 350, 55 Erieview Plaza, Cleveland, OH 44114

Many body joints are potentially replaceable, but only hip and knee implants are common. Chances are you or someone you know will eventually have an artificial hip or knee. Arthritis, the predominate cause of severe joint damage, already affects nearly 40 million Americans and is expected to increase with the graying of the population. The predictable result, a pain free-joint with nearly normal function has made implants popular. In Ohio, major joint replacements under Medicare increased from 1.4% of 1984 bills to 1.7% in 1985 while hospital stay days increased from 1.0 to 1.2 million days.

Many materials have been tried during this century in replacements. None provided long-term success until 1961, when a bone cement was developed that serves as a buffer to dissipate stresses. However, this cement tends to crumble after 10-15 years. Because of this limited implant life, surgeons routinely consider patients under 50 as unsuitable for implants. However, recent development of a cementless joint, aimed at the young patients may make implants available to many more people.

Various studies have shown implants enhance the quality of life and reduce the demand for community health and welfare services. Our paper describes the impact of implants on the health care system.

9:30 ELIGIBILITY FOR FEDERAL PROGRAMS: SIMPLE OR COMPLEX? William F. Laurie, U.S. General Accounting Office, Room 350, 55 Erieview Plaza Cleveland, Ohio 44114

We determined the number of factors for 97 Federal benefit programs. The number of eligibility factors that a program has determines the amount of information that is needed to determine if a client is eligible or not. In turn the amount of information determines the amount of verification that a caseworker has to perform. The number of factors for a program may be small such as one or as large as 24 factors. Some are common to many programs; others are particular to some programs. The variety is large and its impact is significant.

What begins as a simple claim for benefits between two individuals--client and caseworker becomes the process of obtaining information for as many as 24 categories. For example, an elderly person might have to provide over 280 data items to qualify for supplementary income.

One factor can also be used for more than one purpose adding to the complexity. For example, in the Aid for Dependent Children program, social security number, date of birth, citizenship is used for determining eligibility. The factor work experience is used for determining benefit amount. And, the factor unearned income has two uses--determining eligibility and benefit amount.

Our paper will discuss the complexity of determining eligibility for social programs.

9:45 FEMALE JUVENILE DELINQUENCY: ENVIROMENTAL AND SOCIETAL AFFECTS LESLIE A. METLICKA MOUNT UNION COL. c/o DR. J. HAHN DEPT. OF SOCIOLOGY ALLIANCE, OHIO 44601

Most researchers have been interested in the male juvenile delinquent, while directing little attention to the female juvenile delinquent. This research explores the effects of sociodemographic and enviromental characteristics which have a significant impact on the female delinquent.

The techniques of Multiple Regression, Factor Analysis, and Path Analysis were used in determining the factors predicting female juvenile delinquency. Overall, the sociodemographic factors were more useful in explaining why females commit crimes. In contrast to past research, the family, a primary group was not a significant predictor. The research findings illustrate the importance of examining the female juvenile delinquent. As the concern for women's position within society has increased, so should the concern for young females in research circles be amplified.

10:00 RELAPSE IN ALCOHOLISM Lori A. Jasenak, Arun Hatwalkar, David Bryant, Elizabeth R. Johnson
1388 Dietz Avenue Akron, Ohio 44301

The purpose of this research was to determine if alcoholic relapse could be explained in terms of Status Passage theory. The study sample consisted of eighteen alcoholics currently in treatment who were interviewed using open-ended questionnaires. Analysis of the interview data revealed many reasons for relapse, which were grouped into nine categories, including: aspects of alcohol itself, enviromental factors, occupational factors, intimate/spouse problems, friendship problems, psychological factors, family problems, legal troubles, and financial problems. The Status Passage theory variables desirability and multiplicity were applied to the findings. Several reasons given for relapse affected the the desirability of remaining sober, and thus prompted a return to drinking. Multiple status passages competing with the recovery passage also were found to promote a return to the relapse condition. From our findings, we believe that application of Status Passage theory to alcoholic relapse could be an aid in developing treatment programs to prevent this condition.

10:15 AN OVERVIEW OF THE STATUS PASSAGE INVOLVING A.I.D.S. C. Herrington, D. Kukwa, A. Malviya, I. Veluchamy, K. Woodruff. 8205 Goodman Ave., Cleveland, Ohio 44105

The objective of this study was to test a current theory of status passage by applying it to the Acquired Immune Deficiency Syndrome. The method of research involved intensive, open-ended interview sessions with sixteen professionals who deal with A.I.D.S. patients. The results obtained were especially substantiative in three areas. In each of these areas findings of interest unique to the professionals as well as to the patients were established. First, in terms of circumstantiality, (whether the passage is made alone, in aggregate or collectively) professionals experience their passage in loose aggregates. On the other hand, the patients' circumstantiality is dependent upon their geographical location. Second, in terms of multiplicity, (the concept that persons experience more than one status passage at a time) the professional, in addition to his normal responsibilities to the patient, is often presented with alienation from his colleagues due to the association with A.I.D.S.. The patient, as well as experiencing the normal death and dying status passages, encountered passages which were directly related to the disease syndrome's association with homosexuality. Examples of this are the passages involved with, "coming out of the closet," or the accusation of being homosexual. Finally, in terms of stigma, (a negative perception toward an individual) both professionals and patients experienced stigmatization due to homophobia (fear of homosexuality) and fear of contagion. This was determined to be the primary cause of many of the aforementioned multiple passages.

10:30 **INCIDENCE OF CANCER IN SUMMIT AND PORTAGE COUNTIES: A PILOT SURVEY.** **T. Neal Garland and Naoko Oyabu, Dept. of Sociology, University of Akron, and Phillip Marcin, Cancer Control Consortium of Ohio (Region VIII) and Cancer Resource Center, NE Ohio Universities College of Medicine.**

Health statistics in the United States often are not readily available. This makes it very difficult for health service providers and planners to ascertain the needs of target populations. Direct surveys of the population offer one way of learning about the health status and health needs of such populations. This paper reports on a health status pilot study conducted in Summit and Portage counties regarding the incidence of cancer and the needs of cancer patients. Results showed that 12.1 percent of the 124 households in the sample contained a cancer patient in 1984. An additional 4.8 percent had contained a cancer patient during the previous 5 years. The need for selected services is assessed and the feasibility of conducting a larger-scale health status survey of the two counties is explored.

10:45 THE NEW-IMMIGRANTS: SOCIOECONOMIC AND DEMOGRAPHIC DIFFERENTIALS OF MIDDLE SOUTH AND WESTERN SOUTH ASIAN IMMIGRANTS. Elias T. Nigem and T. A. Petee. Department of Sociology, University of Toledo, Toledo, Ohio 43606.

This paper examines selected socioeconomic and demographic differentials of the "New-Immigrants" to the U.S. from Middle South and Western Asia: India, Pakistan, Iran, Turkey and Arab countries. Data for this study comes from the 1980 U.S. Census of population microdata public use tapes and from the 1983 current population survey matching files of April, March, and June. In general, these immigrants tend to fair well in the market. They are above the national average in terms of professional occupation, income, and higher education. Demographically, they have a higher a higher proportion of the elderly and much lower proportion of persons under 15 years of age than the native population. Their fertility rates tend to be higher than the national average. Similar to earlier Asin immigrants, they are more likely to be metropolitan oriented.

SECTION I. ANTHROPOLOGY AND SOCIOLOGY
AFTERNOON SESSION - SNYDER MEMORIAL 132
NORTHERN OHIO ARCHAEOLOGY SYMPOSIUM
SATURDAY, APRIL 26, 1986
JONATHAN BOWEN, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 LATE ARCHAIC AND EARLY WOODLAND SETTLEMENT AND TRADE-EXCHANGE SYSTEMS IN THE SOUTHWESTERN LAKE ERIE DRAINAGE BASIN (CA. 2500 B.C.-1 A.D.). David M. Stothers, Ph.D., Director, Laboratories of Ethnoarchaeology, The University of Toledo, Toledo, Ohio 43606

Based upon 15 years of archaeological excavation research in the southwestern Lake Erie region, models have been constructed to interpret and explain the existence of: 1) Trade and Exchange, and 2) Settlement-Subsistence systems which operated in the Late Archaic (Feeheley phase: ca. 2500-600 B.C.) and the subsequent Early Woodland (Leimbach phase: ca. 600 B.C.-1 A.D.) societies of that region.

Information is presented suggesting the following interpretive models: 1) a local trade and exchange network existed in the western Lake Erie region which distributed "cache blade" preforms fashioned from locally derived Pipe Creek chert; 2) trade and exchange beyond the local Feeheley-Leimbach cultural network is suggested by exotic chert cache deposits containing lithic materials derived from southcentral Ohio, and the Niagara River region at the eastern end of Lake Erie; 3) Feeheley-Leimbach societies were characterized by an annual settlement-subsistence cycle which featured a spring-summer coalescence and a fall-winter dispersal pattern for local nuclear family units; 4) local catchment configurations suggest a societal structure in which several Local Bands were affiliated to form larger Regional Bands. Each Regional Band is believed to have had an associated cemetery, in which each affiliated Local Band periodically deposited their dead.

2:15 STABLE CARBON ISOTOPE ANALYSIS: CULTURAL AND BIOCULTURAL IMPLICATIONS FOR THE PREHISTORIC POPULATIONS OF WESTERN LAKE ERIE. Susan K. Bechtel, Laboratories of Ethnoarchaeology, University of Toledo, Toledo, Ohio 43606.

Stable carbon isotope analysis, coupled with corroborating archaeological evidence, has recently been applied to trace the introduction and subsequent rise of maize consumption at several prehistoric sites in the western Lake Erie region. 13C fractionation values obtained from this analsis also have generated new data regarding the intensity of maize consumption from ca. 1000 B.C. through proto-historic times. It additionally has been possible to make dietary comparisons between Western Basin and Sandusky Tradition populations from northwestern and north-central Ohio. 13C fractionation values from prehistoric sites in New York, West Virginia, Illinois, southern Ohio, southern Ontario, and the Upper Mississippi Valley have made possible inter-regional comparisons of maize consumption and agricultural intensification as well. Overall, the strengths and weaknesses of stable carbon isotope analysis as a technique for the reconstruction of ancient diets have been examined and evaluated.

2:30 AN ANALYSIS OF PREHISTORIC ARCHAEOLOGICAL SITES IN THE TIFFIN SOUTH QUADRANGLE, SENECA COUNTY, OHIO. Dan Fox, 7603 Wahl Rd., Vickery, Ohio, 43464.

The Tiffin South quagrangle area includes the confluence of the Sandusky River and Honey Creek. Over twenty-five archaeological sites ranging in age from 8000 B.C. to A.D. 1300 have been discovered in this area. Stable carbon isotope analyses suggest that corn horticulture was being practiced by A.D. 900. After A.D. 1300 the region was devoid of settlements until the historic period. This marked population shift may have been a response to prehistoric warfare.

2:45 HISTORIC PERIOD ARCHAEOASTRONOMY IN WYANDOT COUNTY, OHIO. Jonathan Bowen, 403 Sandusky Ave., Fremont, Ohio 43420.

In November 1833 an intense meteor shower was visible in eastern North America. Local history records that many individuals in the Wyandot County area were very frightened, believing that the end of the world was at hand. By 1834 gravestone cutters of the Wyandot County region were routinely using falling stars as a motif. For the next fifteen years this spectacular astronomical event was commemorated on gravestones which are located at the Dunn, McCutchenville Catholic, Macedonia, Little Sandusky, and Fehl cemeteries in Wyandot County.

3:00 A QUANTITATIVE AND QUALITATIVE ANALYSIS OF FISH REMAINS FROM THE BEAR FORT ARCHAEOLOGICAL SITE, FREMONT, OHIO. Ted Cavender, Museum of Zoology, Ohio State University and Jonathan Bowen, 403 Sandusky Ave., Fremont, Ohio 43420.

Materials discussed in this paper originate from site (33S A8 Feature 3), located adjacent to the Sandusky River, that has a Carbon 14 date of AD1570 $\pm$ 70. During July and August 1985 a storage pit, secondarily used by the amerinds as a garbage pit, was excavated in vertical section. Characteristics of the pit indicate it was filled with material accumulated over a short period of time - probably several days. A 45 liter volumne of fish skeletal remains was removed from the bottom 0.3m of the cylindrical pit which measured 2.2m in diameter. Seventeen species of fish were identified from these remains. The total fish material removed from the pit represented 335 adult individuals; 70% of that number belonged to one species, Moxostoma macrolepidotum. Other species well represented in the material were M. carinatum (4%) and Morone chrysops (16%). The evidence presented from the large number of M. macrolepidotum indicates the fish were captured during their annual spawning migration up the Sandusky River from their residence in Lake Erie. Based on present knowledge of fish movements in the Sandusky River, time of capture was most likely in late April or early May when water temperatures reach 13-16° C. Not all the fish utilized are typically riverine. Some species were probably taken in Sandusky Bay.

3:15 ASHTABULA POINTS IN OHIO: CA.1500 B.C. Robert Hill, 2105 Elm Drive, Fremont, Ohio 43420.

Ashtabula-type projectile points were used during the Archaic period. These points are found in an area stretching from western Ohio through Pennsylvania and New York. Pipe Creek flint, which occurs in north-central Ohio seems not to have been utilized as a raw material for Ashtabula points, although they have been recovered in relative abundance near the quarries.

SECTION J. CONSERVATION
MORNING SESSION - BOWMAN ODDY 2022
SATURDAY, APRIL 26, 1986
ROSANNE W. FORTNER, PRESIDING

9:00 FORECASTING NATURAL GAS CONSERVATION RESULTING FROM FURNACE EFFICIENCY CHANGES by Patrick J. Reily, Dayton Power & Light Co., PO Box 1247, Dayton, OH 45401

This paper discusses a method to forecast change in natural

gas demand resulting from replacement of older, less efficient gas furnaces with newer high efficiency models in Dayton Power & Light's (DP&L) service area. Econometric methods proved inadequate for forecasting replacement effects due to lack of sufficient historical data for a useful time series. Methodology developed could be best described as an "engineering" approach. Information from DP&L residential surveys, customer account statistics, local weather data and heat loss algorithms from National Electrical Manufacturers Association served as primary resources for this analysis. Data regarding thermal envelope characteristics of service area homes and local weather statistics were used to calculate average heat loss per home. Average use per customer was computed for each major existing furnace type grouping: forced air, gravity and hot water/steam. Information was used with earlier heat loss estimates to produce furnace efficiency estimates of 67.2%, 55.7% and 53.6% for respective types, proving consistent with federal statistics. Economic and demographic customer profiles were developed by type and used with furnace life expectancy estimates, replacement cost assumptions and historical data to develop anticipated replacement schedules. Method shows replacements reduce residential demand by more than 11% by 1995.

9:30 ACID MINE DRAINAGE HISTORY OF LAKE HOPE. BRANT, Russell A., and HUNTSMAN, Brent E., Kentucky Geological Survey, 311 Breckinridge Hall, University of Kentucky, Lexington, Kentucky 40506, and Brehm Laboratory, Wright State University, Dayton, Ohio 45435.

Lake Hope is located in northeastern Vinton County about 18 miles west of Athens, Ohio. The lake and its mine drainage problem serve as a microcosm and paradigm of acid mine drainage in the northern Appalachian coal field. Small quantities of coal were mined in the Lake Hope watershed prior to construction of the impoundment in 1939. But increased quantities were mined during World War II and through the early 1960's. The consequent acid water problem was recognized early, and efforts to reduce the acidity in the lake have included limestone cribs in Sandy Run, direct liming of the lake, removal of gob piles, and sealing a selected area with a blanket of clay. Cribs of limestone failed because of plating effects, direct liming of the lake was costly and produced limited success. The clay blanket and plug demonstration has failed for specific reasons yet to be determined. Current work on these acid source waters includes studying the feasibility of using artificially developed sphagnum bogs for treatment of the water.

10:00 ANIMAL RIGHTS, WILDLIFE CONSERVATION, AND RESEARCH. Walter Sheppe, Department of Biology, University of Akron, Akron, Ohio 44325

Since publication of Singer's "Animal Liberation" in 1975, the animal rights movement has become large, active, and politically effective. This movement challenges many of the practices of scientists and conservationists and potentially could have a severe effect on research and conservation. Because of this, it should receive more attention from the scientific and conservation communities than it has so far. The basic difference between animal rights advocates and wildlife conservationists is that the former are concerned about the well-being of individual animals while the latter are concerned about the survival of populations and species. The most extreme animal rights advocates would stop all meat eating, hunting and trapping, and animal experimentation. Others only want to regulate these activities to minimize animal suffering. We should carefully consider their arguments, adopt any of their ideas that may be appropriate, and work to educate the public and legislators on the need for animal experimentation, scientific collecting, and population management.

10:15 EVALUATION OF THE SCHOOL PROGRAM AT OLD WOMAN CREEK NATIONAL ESTUARINE SANCTUARY. April C. Lahm and Rosanne W. Fortner, The Ohio State University, School of Natural Resources, 2021 Coffey Rd., Columbus, Ohio 43210

Old Woman Creek is the only National Estuarine Sanctuary on the Great Lakes. Consisting of a barrier beach, creek and uplands, the sanctuary offers interpretive and educational opportunities through a trail system and visitor center, well equipped to handle both school groups and the visiting public. Since the primary management objective of the sanctuary is to increase public understanding through education, a scrutinizing look at the school program has been taken. The Old Woman Creek educational program is one of the most developed among estuarine programs in the United States. It is being evaluated through the use of tests to measure both student attitudes and knowledge about estuaries. The tests cover concepts about estuaries in general and specific facts about Old Woman Creek that are related by the exhibits at the visitor center and by Old Woman Creek personnel. Exposure to the Old Woman Creek educational program also changes attitudes and understanding about the importance of estuaries. Thus, while this evaluation focuses only on the Old Woman Creek School program, the series of questions developed about estuaries and the evaluation of the program are of interest to all National Estuarine Sanctuaries.

10:30 STUDENT AWARENESS OF RESOURCE IMPORTANCE AS EVIDENCED BY ART. Marjorie Pless and Rosanne W. Fortner. The Ohio State University, School of Natural Resources, 2021 Coffey Rd., Columbus, OH 43210

Realizing the potential of art and literature as a vehicle for expressing knowledge and attitudes about the Great Lakes, the Ohio Sea Grant Education Program sponsored a state-wide art competiton exhibition for 5th-9th graders. In Ohio 1986 is the Year of the Lake. Each art entry therefore focused on one of several aspects of Lake Erie, including its aesthetic value, recreational and economic development opportunities, and cultural and historical importance. A content analysis of the entries indicates that students see a variety of forms of the lake's importance. Comparisons of content between the work of students whose teachers used Sea Grant visual aids and those who did not use the aids indicates the extent to which ideas for art subjects can be influenced by advance stimuli.

SECTION J. CONSERVATION
AFTERNOON SESSION - BOWMAN ODDY 2022
SATURDAY, APRIL 26, 1986
JUDITH M. SCHULTZ, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 A PLANETARIUM TRAINING PROGRAM FOR VOLUNTEERS Roberta M. Burns, The Ohio State University School of Natural Resources, 2021 Coffey Rd. Columbus, Ohio 43210

The purpose of this study was to develop and pilot a planetarium training program for high school volunteers at a science museum located in Columbus, Ohio. The study was divided into two sections: (1) a modular learning program about basic astronomy, and (2) a workshop dealing with the speaking and manipulative skills needed to present public planetarium shows. A non-randomized control group/pretest-posttest design was used to measure the effectiveness of the modular astronomy program. Workshop effectiveness was assessed using a semantic differential. Data analysis utilized a t-test and mean scores. The study results suggest a place for a more rigorour approach to the development and evaluation of planetarium training than is currently available.

2:15 ASSESSING ELEMENTARY SCHOOL CHILDREN'S ATTITUDES TOWARD AQUATIC RESOURCES. BRENDA K. MADISON. The Ohio State University School of Natural Resources, 2021 Coffey Road, Columbus, Ohio 43210

Many environmental education researchers agree that attitudes are already well established by the time a student enters high school. This investigation attempted to assess attitude change toward awuatic resources in sixth grade students upon completion of a specified aquatic education program. A Solomon Four-Group design was implemented for two experimental schools and one control school. Seventeen multiple choice questions measured student's cognitive understanding of the subject. Attitudes were measured using seventeen, Likert-type questions. Test scores demonstrated an overall increase in knowledge. Scores also indicated that the curriculum used cultivated significantly more positive attitudes, and the test instrument was a reliable means of measuring these attitudes. Continued research comparing existing aquatic curricula and their effect on attitudes will help to improve efforts in the field of environmental education.

2:30 INTRODUCTION TO THE OHIO RIVER BASIN CONSORTIUM. MITSCH, William J., School of Natural Resources, 2021 Coffey Road, The Ohio State University, Columbus, OH 43210.

The goal of the Ohio River Basin Consortium for Research and Education is to promote inter-institutional research and education in water-related concerns and other environmental issues in the Ohio River Basin. The specific objectives of the Consortium are to: 1) establish an effective mechanism for coordinated, inter-institutional research on environmental and resource problems in the Ohio River Basin, 2) stimulate new research directions and areas of research funding for Consortium members, 3) identify areas that merit new research and support in the Ohio River Basin, 4) encourage cooperation in research among Consortium members, 5) establish and maintain an information base on environment-related research and researchers in the Ohio River Basin, and 6) foster opportunities and respond to needs for multi-institutional education on various aspects of water quality, the environment, and environmental health in the Ohio River Basin. This session will discuss the history and current programs in the Consortium.

SECTION K. GENETICS AND CELL BIOLOGY
MORNING SESSION - BOWMAN ODDY 1059
SATURDAY, APRIL 26, 1986
BONNIE LAMVERMEYER, PRESIDING

9:30 ANALYSIS OF GENETIC POLYMORPHISM OF HEMOGLOBIN, HAPTOGLOBIN AND TRANSFERRIN IN OHIO ODOCOILEUS VIRGINIANUS 1974-1984. Kristi Ann Skeel, and Bonnie Lee Lamvermeyer, Department of Biology, Denison University, Granville, Ohio 43023

This investigation is a re-analysis of an isolated population of Odocoileus virginianus, white-tailed deer, originally examined in the mid-1970's. Blood samples for the current study were obtained during a series of five regulated public hunts at the National Aeronautics and Space Administration's Plum Brook Station during the fall of 1984. Serum and red blood cell specimens were analyzed through polyacrylamide gel electrophoresis. In this investigation we observed an apparent shift in frequencies of hemoglobin, haptoglobin, and transferrin phenotypes. The G-test of Independence revealed that there was a correlation in several haptoglobin and transferrin phenotypes that had not been observed in the previous study. Possible sources of bias were cover conditions at the time of the hunt, a nonrandom sample of deer, and uneven tracking dye migration during electrophoresis. The results of this research could influence management decisions about optimal herd number for this particular population of deer as well as those in areas where the gene flow of animals is restricted, such as in zoos and parks.

9:45 PHOSPHORYLATION OF PROTEINS IN THE MALE AND FEMALE RAT BRAIN. V. Ruff, M. Roadruck, and E.F. DuBrul, Department of Biology, The University of Toledo, Toledo, OH 43606.

We are studying in vivo incorporation of intracranially injected $^{32}PO_4$ into proteins from three different cellular fractions of the hypothalamus and cortex. The highest specific phosphorylation of proteins is in the nuclear fraction, followed by the post-mitochondrial supernatant and the mitochondrial fraction. Specific phosphorylation is usually highest in hypothalamic extracts as compared to cortical extracts. No consistent differences are observed between sexes. SDS/PAGE anlysis does not demonstrate any qualitative differences in phosphorylated proteins between sexes or brain regions at 2 hours post-injection.

Protein phosphorylation system is also being studied in vitro. Subcellular fractions of male and female hypothalamus and cortex are assayed for cAMP-sensitive and insensitive protein kinase activity and endogenous phosphorylated proteins are compared using SDS/PAGE. There do not seem to be any large differences in kinase activity between the sexes, but it does appear that kinase activity in all subcellular fractions is greater in the cortex than in the hypothalamus. No qualitative differences are observed in SDS/PAGE.

(Supported in part by NIMH/ADAMHA Small Grant 1R03 MH39399-01A1, UT deArce Program Award, and NSF Honors High School Teachers Research Program at UT.)

10:00 TESTICULAR LH RECEPTORS AND STEROIDOGENESIS IN TWO STOCKS OF OUTBRED SWISS MICE. A.G. Amador, T.A. Parkening*, T.J. Collins*, and A. Bartke. Department of Physiology, Southern Illinois University School of Medicine, Carbondale IL 62901; *Department of Anatomy, University of Texas Medical Branch, Galveston TX, 77550.

Testicular LH receptor and plasma testosterone concentrations were analyzed in two stocks of outbred Swiss (CD-1 and ICR) mice under basal conditions and after a single injection of hCG (0.3 IU/g BW). Basal LH receptor (40 ± 2 vs. 15 ± 2 fmol/mg prot.) and plasma testosterone concentrations (2.8 ± 1.8 vs. 0.5 ± 0.1 ng/ml) as well as the testosterone/receptor ratio, were significantly higher in CD-1 than in ICR mice. Twenty-four hours after hCG administration, plasma testosterone levels (56.0 ± 5.2 & 50.3 ± 7.6 ng/ml) were greatly elevated in mice of both stocks, whereas the concentration of testicular LH receptors was decreased only in ICR mice (37 ± 6 & 3 ± 1 fmol/mg prot). Plasma FSH, LH, and PRL levels were similar in both stocks of mice. The present results show that two populations of genetically related "normal" outbred animals are very surprisingly different in several aspects of testicular endocrine function in spite of similar plasma pituitary hormone levels, and suggest that important differences may exist also between other stocks of "normal" laboratory animals.

10:15 ULTRASTRUCTURAL STUDY OF MYOCARDIUM FROM 13-LINED GROUND SQUIRREL (Spermophilus tridecemlineatus) BEFORE AND AFTER HYPOTHERMIC PERFUSION IN AN ISOLATED WORKING HEART APPARATUS. A. Darvish and C. Black Dept. Biol., Univ. of Toledo OH 43606.

Ultrastructural study of myocardium from the 13-lined ground squirrel, a hibernator, was performed in order to observe changes occuring after hypothermic perfusion in an isolated working heart apparatus. Isolated hearts from hibernators maintain ventricular function at temperatures near 0°C in the working heart apparatus, whereas hearts from nonhibernating mammals stop functioning between 15 and 20°C. Sections of 90-120 A from ground squirrel hearts were prepared and stained for electron microscopy study before and after 2.5 hrs. of hypothermic perfusion. Sarcomeres, their subcellular components, and mitochondria from left ventricular myocardium of hypothermic perfused hearts did not differ significantly from that of non-perfused hearts. However, average myocardial lipid droplet count doubled over the 2.5 hrs. of hypothermic perfusion. This result suggests a possible mechanism facilitating utilization of lipids as an energy source by mitochondria in the hibernating heart.

10:30 STRUCTURE OF THE RIBOSOMAL GENES IN THE GENUS RICKETTSIA: A MOLECULAR PHYLOGENETIC ANALYSIS J. Clark*, D. Ralph+, K. Poetter*, P.A.Fuerst*‡ and P.S. Perlman*+, *Department of Genetics and +Molecular, Cellular and Developmental Biology Program, The Ohio State University, Columbus, OH 43210

Bacteria in the genus Rickettsia are obligate intracellular Gram-negative parasites which inhabit a variety of arthropod hosts, and which cause several diseases in mammals. We have begun to analyze the organization of the rRNA genes from members of the genus, using genomic Southern blotting and hybridization with recombinant DNA probes. Genetic probes from the 16S rRNA gene of Rochalimaea quintana, a bacteria related to Rickettsia, were used to identify heterologous sequences of the rRNA cistron in Rickettsia. Preliminary results indicate that R. rickettsii, the type species of the genus, contains only a single rRNA cistron. This contrasts with the multiple copies of the rRNA genes found in other prokaryotes. Studies of eight species in the Spotted Fever Group of Rickettsia, three species from other related groups within the genus, and two species from the leukocytic rickettsiae genus Ehrlichia have also been done. Genetic differentiation between species is evident, as judged by the restriction fragment pattern polymorphism (RFPP). RFPP's from the 16S rRNA gene region can be used to identify each species, extending previous work reported by our laboratory using random sequence RFPP's. The 16S rRNA gene region from R. rickettsii has been cloned into a bacterial plasmid and is being sequenced for further study.

SECTION K. GENETICS AND CELL BIOLOGY
AFTERNOON SESSION - BOWMAN ODDY 1059
SATURDAY, APRIL 26, 1986
ROBERT ESSMAN, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 THE NON-REDISCOVERY OF MENDELISM IN 1900. Alain F. Corcos and Floyd V. Monaghan. Department of Natural Science. Michigan State University. East Lansing, Michigan 48824.

The usual account is that three researchers, de Vries, Correns, and Tschermak, independently of Mendel, and of each other, simultaneously rediscovered Mendelism. Examination of their own writings indicates they had read Mendel's paper before they wrote theirs, that they had not understood the implication of their own data before reading Mendel's, and that only Correns had completely understood Mendel's paper when he read it.

2:30 AN ANALYSIS OF C AND G-BANDING IN THE CHROMOSOMES OF ACANTHOCYCLOPS VERNALIS DURING EARLY DEVELOPMENT. David M. Standiford. Zoology Dept. Miami University, Oxford, Ohio 45056.

The effects of chromatin diminution on the morphology and internal structure of the chromosomes of Acanthocyclops vernalis (Copepoda; Cyclopidea) was examined through the use of C and G-banding. Chromatin diminution is the elimination of specific portions of the chromosome during early development. The chromatin that is lost during diminution organizes into H-segments during the cleavage division prior to diminution. Pre- and post-diminution chromosomes differed in overall length by 25-50% and both C and G-banding patterns were radically altered by the diminution process. Pre-diminution C-bands were well defined and intensely staining while post-diminution C-bands were either absent or poorly defined. G-bands were similarly affected by diminution. When the location of C-bands and H-segments were compared, some H-segments had corresponding C-bands and others did not. Comparisons between H-segments and G-bands yielded similar results. These observations indicate that H-segments are not necessarily made up of highly repetitive DNA and therefore have at least the potential to carry genetic information.

2:45 INTERFAMILIAL CHROMOSOME HOMOLOGY IN THE ORDER DIPTERA. Jong S. Yoon, Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403-0212.

Analyses of the polytene chromosomal banding patterns for the study of evolutionary relationship of species belonging to the Genus Drosophila have been carried out mainly within or between closely related species groups for forty years. Wider intergroup phylogenies in Drosophila have been studied between the Hawaiian "modified mouthparts" and the "picture-winged" species groups. Furthermore, intergeneric chromosome homology in the Family Drosophilidae was established by comparative polytene chromosome analysis (Yoon, et al., 1972). Recently it has been attempted to establish the interfamilial relationship among two Families in the Order Diptera by comparative karyological analysis. The present report is concerned with Drosophila mimica Hardy (Drosophilidae) and Euxesta quaternaria Loew (Otitidae). Both species have six pairs (2n=12) of metaphase chromosomes. All six elements of the polytene complement of one species could be readily homologized with elements of the other on the basis of the typical and unique features of banding patterns of certain sections within the corresponding chromosomes. The amount of homology established varies considerably with the chromosomes, suggesting that each chromosome has undergone different degrees of rearrangements during its evolutionary history. (Supported in part by an NSF grant BSR-8400615.)

3:15 Facultative Carnivory in Drosophila hydei. Ann L. Rypstra and Thomas G. Gregg, Department of Zoology, Miami University, Oxford, Ohio 45056.

Drosophila are characterized by their tendency to forage on yeasts, fungi, and bacteria, associated with fermenting vegetable matter. In this report we present surprising examples of D. hydei reproducing on a dead cicada (Tibicen chloromera), a dead spider (Nuctenea cornuta), the carcasses of other adult hydei, and even ground beef (Bos taurus). In the case of the cicada we show, by comparing the biomass of the Drosophila produced (.09 g) to the consumable biomass of the cicada (.9 g), that the larvae must have consumed the cicada tissues directly rather than through microorganisms that had fed on the cicada. Also, larvae completely solubilized the bodies, including the exoskeleton, when growing on adult carcasses. We conclude that these larvae are producing their own insect digesting enzymes, and that they are secreting them extra-somatically onto the substrates consumed. These conclusions are based on, 1) our calculation that there was no cicada biomass to spare on microorganisms, 2) our observation that carcasses and exoskeletons were not solubilized in the absence of larval activity and, 3) the fact that the larvae turned the viscera of the cicada, the spider, and the adult flies into juicy emulsions.

3:30 BASIC BIOLOGICAL STUDIES OF THE DROSOPHILA VIRILIS SPECIES GROUP. Edward J. Durbin and Jong Sik Yoon. Dept. of Biological Sciences, Bowling Green State Univ., Bowling Green, OH 43403

The Drosophila virilis species group consists of 13 species and subspecies. Although these species have not been as well-studied as D. melanogaster and its close relatives, the D. virilis group may be better suited for evolutionary studies. Adult longevity and the time needed for development from egg to adult are two components of the basic biology of these species for which data were not previously available. Both male and female adult longevity on standard cornmeal medium were examined for each of the species of this group. Adult longevity of females was longer than that of males except for three species, however none of these differences was statistically significant. The mean longevity of females ranged from 26 days for "smithers" to nearly 90 days for the Texmelucan strain of D. virilis. For males the mean longevity ranged from 24 days for D. americana, Chinook strain to 75 days for the Moscow strain of D. lummei. There were significant species differences for both males and females. The time spent in each stage of development, egg to larva, larva to pupa and pupa to adult was studied for each species as well. There were significant species differences for each of the stages. The shortest total egg to adult development period was for D. virilis, 17 days and the longest was 25 days for D. littoralis. These results contribute to our understanding of how this species group evolved.

SECTION K. GENETICS AND CELL BIOLOGY
POSTER SESSION - STUDENT UNION, INGMAN ROOM
SATURDAY, APRIL 26, 1986

Board F @ 9:00 AM **DOMINANT LETHAL MUTATIONS IN SPRAGUE DAWLEY RATS** *Dierdre Dennie, *Alan Taylor, Angela Wilson, and Willie J. Washington, Department of Biology, Central State University, Wilberforce, Ohio 45384.

This study was designed to investigate the mutagenic potential of toluene using the dominant lethal mutation assay. Male Sprague Dawley rats were given intraperitoneal injections (ip) of toluene in corn oil for five consecutive days. The amount injected was 0.4 of the LD_{50} or 1.34 ml/kg body weight. Corn-oil was given as the negative control Each male was mated with one female per week for seven weeks. Females were sacrificed 14 days after mating for analysis of their uterine content. The following variables were analyzed: The total number of implants, the number of dead fetuses, and the number of live fetuses per pregnancy. After three weeks of mating there was no difference in the total number of implants or the number of dead implants or the number of dead implants per female in the control and the experimental groups. These preliminary data suggest that toluene had no effect on the mature sperm or the spermatide stage of spermatogenesis in that these were the treated stages of spermatogenesis involved in fertilization of eggs which developed during the first weeks

of mating. Additional data will be collected to determine if other stages of spermatogenesis are adversley affected. Supported by NIH Grant. #RR08052.

Board G @ 9:00 AM — INSULIN OR INSULIN-LIKE PEPTIDES IN THE MOUSE SEMINAL VESICLES. M.S. Stahler*, B.Pansky, G. C. Budd & B.Cordell**. *University of Toledo, Medical College of Ohio & **California Biotechnology, Inc.

Using immunocytochemical techniques, insulin-like immunoreactivity was demonstrated in tissue sections & cell cultures of mouse seminal vesicles (S.V.). S.V. fragments were fixed in 2.5% glutaraldehyde, then processed and embedded in epoxy resin. Cultured epithelial cells were grown on coverslips in Dulbecco's MEM (4-6 days) and fixed as above. Tissue sections (1 um thick) & cultured cells were stained with the indirect or PAP immunocytochemical techniques. Insulin-like immunoreactivity was observed in epithelial cells in the S.V. preparations. In-situ cDNA-mRNA hybridization was applied to determine whether the insulin-like reactivity could be due to local synthesis. Epithelial cells grown in culture were hybridized with a ^{3}H-labeled rat insulin cDNA probe at 20^{o}C for 18 hrs., covered with autoradiographic film and developed after 14-30 days. Preliminary results indicated hybridization of the labeled cDNA with intra-cytoplasmic insulin-specific mRNA. It appears that S.V. epithelial cells may be capable of endogenously synthesizing an insulin or insulin-like peptide. The functional significance of these findings are currently under investigation. Supported by NIH grant #AM33761.

SECTION L. MATH AND COMPUTER SCIENCE
MORNING SESSION - ENGINEERING SCIENCE 2039
SATURDAY, APRIL 26, 1986
BEN GUILD, PRESIDING

9:00 **PETRI NETS: A MODELING TOOL FOR REPRESENTING SOFTWARE DESIGN STRUCTURE.** **Gurdeep Singh Hura, Computer Science Department, Wright State University, Dayton, Ohio 45435.**

Abstract

A software system usually consists of systematic and well defined interactive processes possessing some relationship like hierarchy, inclusion, etc. These relationships are different than the structural properties of the system in the sense that later are concerned with static behavior, execution of sequence and the flow of control. This does not give any idea about what the software is going to do and how it works.

In order to represnet and analyze the software system structure the available techniques in one way or the other require two diagrams/models, and further, don't represent the relationships very precisely. The present paper discusses the use of Petri nets for the representation and analysis of software system structure. This modeling tool has drawn a considerable interest from the researchers in the past few years for modeling concurrent and asynchronous systems. The dynamic behaviour of the system can be studied through states or marking and their changes at various levels of abstractions.

This paper makes an endeavour to use Petri nets for modeling software design structure using the notion of events and conditions. The reachability concepts of Petri nets are used to study the dynamic behaviour of the modeled systems in terms of the movement of tokens and the change in the conditions of the system. The preposed representation offers a great potential for the analysis of software system structure as the simulation of the system can be obtained in terms of states which in turn yield the various sequences of events and decision capability for the modeling tool to consider accordingly.

9:15 COMPUTER PROGRAMMING: ITS DIFFICULTIES AND HOW PROGRAMMERS CAN ADJUST. Karen Gill, 3145 Creekside Dr., Westlake, OH 44145.

Recently computer applications have become large and complex enough to require alternative solutions to the von Neumann architecture. The new architectures require multiple processors with either master-slave or distributed control, and memory that can be private, common, or some combination of the two. However, new hardware solutions involving concurrent processing required new software solutions to problems not encountered in sequential programming. The additional problems include time-varying errors, contention for resources, deadlocking, communication control, and dependencies on varying processor speeds.

Languages such as Concurrent Pascal, Modula-2, and ADA have concurrent capabilities, and other languages are being enhanced to include such facilities. In this presentation I will discuss some difficulties of concurrent programming and introduce some methods (e.g., semaphore, monitor, and rendezvous) that have been developed to overcome these problems.

9:30 ALGORITHM PARTITIONING AND ALLOCATION FOR A DATA FLOW SIGNAL PROCESSOR. M. Jamali, M. Aref G. Jullien*, University of Toledo, 2801 W. Bancroft Street, Toledo, Ohio 43606.

Real time applications of computer vision, image, speech and signal processing, etc. require high speed computations. Recently research efforts are directed towards the exploitation of parallelism in the algorithms and parallel computation of these algorithms. An architecture of a real time general purpose Data Flow Signal Processor (DFSP) based on the binary tree structure has been developed for real time signal processing application. A control software is required to partition and allocate the application algorithms for the DFSP. This software will shield the programmer with the internal details of the DFSP.

We propose a knowledge base system (KBS) which will partition and allocate tasks for the DFSP. KBS will formulate a target equation representing the DFSP, then it will start to fit the given task to DFSP. Once the KBS defines the operation of each processor in the DFSP, it will partition and allocate given tasks to the DFSP. KBS tries different allocation schemes to get a scheme which will avoid communication bottlenecks maximizing the throughput rate of the DFSP. KBS will be applied to different application algorithms such as: matrix multiplication, one and two dimensional convolution and autocorrelation. We are presently developing the KBS on a VAX 780 using Franz Lisp.
*University of Windsor, Windsor, Ontario. Canada.

10:00 DESIGN OF A SIGNAL PROCESSING CELL. M. Jamali, M. Hussain, G. Jullien*, Dept. of Electrical Engg. University of Toledo, Toledo, Ohio 43606

The growth in the area of VLSI has led to the implementation of many special purpose signal processing hardware. Real time applications of signal processing require high speed computations. A general purpose data flow signal processor (DFSP) has been developed previously which is based upon a binary tree structure. A Residue Number System (RNS) is used to perform arithmetic operations using look up tables. The DFSP utilizes pipeline, parallel and distributed processing approaches to achieve high throughput rates. The DFSP utilizes two yptes of cells, tree cells and base cells. Tree cells perform arithmetic operations using look up tables and require RAMs. Base cells will have separate memories to store coefficients and data and are required to perform simultaneous data read and write operations. A scheme is proposed to utilize two data memories to read and write data at the same time using a read/write control signal. Data can be written in one memory and previously written data can be read from the second memory and their function can be switched. An arithmetic operation will be performed on the data read and its corresponding coefficient. The output will be forwarded to the upward cells for further processing. Base cells will also be used for off line loading of the look up tables. The proposed design will be simulated on VAX-730 and will be tested for different algorithms.
*University of Windsor, Windsor, Ontario, Canada.

10:30 EXPERTISE: A PERVASIVE BUT SURPRISING THEME IN SOFTWARE ENGINEERING Laura Marie Leventhal, Computer Science Dept. Bowling Green State University, Bowling Green, OH 43403

Expertise is a pervasive issue in software engineering. Yet it is not a figural concept in software engineering research or education. Clearly it plays a significant role in the communication between designers and consumers, the disign of the human-computer interface, and other software engineering tasks.

A widely-held belief about expertise is that experts simply "know more." A sampling of recent expertise research, including studies of computer scientists, suggests that this is an inadequate description. Not only do experts "know more," but their use of that knowledge differs from novices. The computer science expert, like experts in other fields, use well-developed perceptual processes.

10:45 MODELING TRANSPORTATION PATTERNS OF COMMON COMMODITY CLASSIFICATIONS. Smith, Alan D., Department of Quant. and Natural Sciences, Robert Morris College, Pittsburgh, Pa. 15219.

Recent years have shown profound advances in applying quantitative approaches in logistics and planning. These app-

roaches, especially in transportation modeling, have provided a theoretical basis for formal statistical tests to aid in the decision-making process. Many of the models dealing with spatially-distributed or geographically-bounded data use statistical methods that revolve around calculating best-fits of response surface with capturing explained variances as the central theme, as evident in polynomial modeling and double Fourier Series for surface fitting of irregularly spaced data.

Expanded ANOVA (analysis of variance) and multiple linear regression (MLR) analysis calculated for the modeling of transportation costs/rates from an origin or shipping location in Richmond, Kentucky to selected and relatively even-distributed destination/warehouse locations in the state of Ohio. A total of eleven expanded ANOVA tables were employed to differentiate which order of trend surfaces accounted for the most significant amounts of explained variance in predicting costs/rates. Line-printer maps were also utilized to illustrate the actual and predicted distributions of costs, as a function of spatial location in Ohio. High R^2 -values and expanded ANOVA techniques, utilizing the full and restricted model concepts of multiple linear regression, provided evidence for geographic trends.

1:30 SECTION BUSINESS MEETING

SECTION M. PSYCHOLOGY
MORNING SESSION - STRANAHAN 107
SATURDAY, APRIL 26, 1986
ISADORE NEWMAN, PRESIDING

9:00 BODY COMPOSITION COMPARISONS BETWEEN ACTIVE AND SEDENTARY COLLEGE FEMALES. Laura Zodnik, Bruce Hollering, Ph.D., Robert Gandee, Ph.D. The University of Akron, Akron, Ohio 44325.

The purpose of this study was to compare body composition (percent fat and lean body weight) and physical activity levels between active and sedentary college women. Subjects were members of The University of Akron women's varsity volleyball team, ($\bar{X}$ age = 19.6, SD $\pm$ 1.4; $\bar{X}$ ht = 173.9 cm, SD $\pm$ 5.3; and $\bar{X}$ wt = 64.4 kg, SD $\pm$ 5.5) and female participants in university bowling and archery classes, ($\bar{X}$ age = 21.0, SD $\pm$ 2.4; $\bar{X}$ ht = 164.7 cm, SD $\pm$ 6.5; and $\bar{X}$ wt = 60.2 kg, SD $\pm$ 11.0). A physical activity index was used to identify activity levels of the two groups and ranged from <20 (sedentary) to 100 (very active). The volleyball group ranged from 40-70 ($\bar{X}$ = 54.0, SD $\pm$ 12.5), and the sedentary group ranged from 12-66 ($\bar{X}$ = 25.5, SD $\pm$ 20.6). Body composition data were obtained from circumference measurements to predict percent body fat (active group $\bar{X}$ = 21.1, SD $\pm$ 3.7; sedentary group $\bar{X}$ = 22.1, SD $\pm$ 7.1). Lean body weight estimates resulted in mean values of 50.3 kg and 46.2 kg for the active and sedentary groups, respectively. The f-test used to analyze the means indicated significant differences ($p<.02$) between activity levels, height, total body weight, and lean body weight. These results indicated that the female volleyball players were taller, weighed more and had more lean weight. There was no significant difference in % fat between the groups.

9:15 THE EFFECT OF MANIPULATING THE SPATIAL DIMENSION OF THE PRESENTATION AND RECALL METHODS IN SERIAL PATTERN LEARNING STUDIES. Christopher L. Edmonds, Dept. of Psychology, Univ. of Toledo, Toledo, Ohio 43606.

The effect of stimulus redundancy upon learning serial patterns was examined in 80 subjects. Stimulus redundancy was manipulated in terms of the presentation and recall methods employed. Analysis of the data indicates that subjects learned random and hierarchically structured serial patterns at equal rates except when stimulus redundancy occurred in both the presentation and recall methods. In this condition, subjects learned random sequences at a faster rate than hierarchically structured sequences. These results are interpreted in terms of a learning mechanism which is highly sensitive to stimulus organization to such an extent that the inclusion of redundant stimulus dimensions does not change the rate of learning hierarchically structured sequences. In contrast, random sequences lack any inherent organization and subsequently the addition of stimulus redundancy increases the number of ways in which subjects may associate elements of the sequence to one another. This redundancy results in an increased rate of learning random sequences. These results support prior serial pattern learning studies which argue that the learning process is highly sensitive to the organization of stimulus events.

9:30 FACTOR STRUCTURE DIFFERENCES FOR WHITES, BLACKS AND HISPANICS FOR ITEMS RELATED TO SELF CONCEPT. Kline, C. D., House, D. V. & Newman, I. Department of Educational Foundations, Zook 301, The University of Akron, Akron Ohio 44325.

This investigation focussed on the identification and description of the respective factor structures of self concept for black, white and hispanic highschool seniors that will provide the means for an improved understanding of self concept. Further, it is believed that this improved understanding will lead to an elucidation of the potential motivating variables of that concept. This study made use of the High School and Beyond *Dataset*. This dataset was based on a sample of 58,000 cases nationwide, and is a stratified sample of the population of high school seniors across the nation. Forty items were selected to be factor analyzed. These were chosen as being related to self concept by expert judges. Further, these are items that educational administrators have long shown interest in, which further validated the item choices. Items dealt with such topics as: locus of control, self perceptions, school success, self esteem, values, and other's perceptions. This information has implications in the field of psychology, such as personality assessment and treatment.

9:45 SUCCESS IN STUDENT TEACHING AS PREDICTED BY CAREER DECISIONS AND ACADEMIC SUCCESS: A QUALITATIVE AND QUANTITATIVE STUDY. Carolyn R. Benz, College of Education, The University of Akron, Akron, OH 44325

Student teaching is the final stage of preparation for preservice teachers. This experience provides a microcosm of initial teaching performance that is closely supervised. In this study success in student teaching (ratings by supervisors on several teaching competencies) was correlated to both qualitative and quantitative measures. A qualitative analysis of student essays revealed rationales for choosing a teaching career. Themes emerging from a processual analysis of these written essays and results were related to student success in student teaching. A second, quantitative analysis, was conducted using the demographic factors of age, sex, and GPA in all courses as well as grades received in selected preservice courses as predictors of performance ratings of supervisors. The presentation will report on the complete findings. Preliminary analysis suggests that classroom management and discipline are less well developed in student teachers at both the elementary and secondary levels, and are unrelated to grades received in previous coursework.

10:00 THE TEACHING/LEARNING PROCESS: STATE OF THE SCIENCE CIRCA 1986. Ralph F. Darr and Joan C. M. Lukich, Room 301 Zook Hall, The University of Akron, Akron, Ohio, 44325

This paper, an update of an earlier paper, The Teaching/Learning Process: State of the Science Circa 1983, will look at the effect that the "back to basics" movement, emphasis upon management by objectives, and the call for merit pay for teachers has had on the teaching/learning process. Focus will be upon how these rather straight forward approaches to resolving educational issues have really affected the complex teaching/learning process. Among the complex variables discussed will be: (1) teacher characteristics, (2) student characteristics, and (3) instructional and organizational characteristics of classrooms. Teacher characteristics will be primarily reviewed from the perspective of student evaluations of instructors and demographic data. Student characteristics will be discussed in terms of (1) personal characteristics, (2) past academic performances, and (3) learning styles. The instructional/organizational section will consider these instructional modes: (1) lecture, (2) teacher managed programs, and (3) cognitive styles. Suggestion for future integrative research will be offered.

10:15 DELINQUENTS AND CRISES RESOLUTION. Denise Arehart 2824 Alisdale #202, Toledo, Ohio 43606

High school students and juvenile delinquents were administered the Erikson Psychosocial Stage Inventory

(EPSI) developed by Rosenthal, Gurney, and Moore (1981). The major purpose was to assess response differences between the two groups with respect to quantitatively addressing the first five stages of Erik Erikson's Psychosocial Stage Theory.

Both adolescent groups were given the EPSI. The EPSI contains 60 statements responded to using a five-point scale where 1 equals "Always or almost always true" and 5 equals "Never or almost never true." There are twelve statements, arranged in random order, which correspond to each of the five subscales. The subscales are: Trust, Autonomy, Initiative, Industry and Identity.

An overall 2 (gender) X 2 (adolescent groups) X 5 (subscales) ANOVA with repeated measures was employed. T-tests also were performed on each subscale between the two groups. The overall ANOVA revealed a significant effect of adolescent groups ($F(1,80)=37.25$, $p<.01$) and of subscales ($F(4,320)= 26.94$, $p.<.01$). The T-tests revealed significant differences between the two groups on each subscale. The delinquents appear to have had more difficulty resolving crises at each developmental stage.

The EPSI appears to hold promise for investigations which may lead to a better understanding of delinquents.

10:30 AN EMPIRICAL COMPARISON OF THE CLARITY OF INTERPRETATION OF A MULTIVARIATE ANALYSIS WHEN COMPARED TO SETS OF UNIVARIATE REGRESSION EQUATIONS. Isadore Newman & Linda Carr, Department of Educational Foundations, University of Akron 44325.

The purpose of this paper is multifaceted. First, to explain why many statisticians suggest multivariate analysis over univariate analysis when multiple dependent measures are used. Second to compare the clarity of interpretation and the types of questions being answered on a multivariate analysis compared to sets of regression equations. Third, to explain the relationship between multivariate and Univariate analysis from a conceptual basis. It is hoped that this presentation will facilitate the research practitioner in the interpreation of their analyses and decrease the probability of making a type 6 error. Data will be run on 30 subjects, with 3 dependent variables(DV) for each subject in a 2X3 design. The regression equations for DV1 will be as described. Please note that their are 2 sets of model comparisons, one for unique variance predicting DV1 independent of the correlation between DV2 and DV3 with DV1, and one for the total variance in DV1, not considering the correlation of DV2 and DV3 with DV1. The difference between models 1 and 2 subtracted from the difference between models 3 and 4 will be the common variance as illustrated in the paper.

10:45 A DEPRESSED COMMUNITY: SEX DIFFERENCES IN LOCUS OF CONTROL AND LIFE SATISFACTION MEASURES. M. R. St. Jean, 301 Arch Ave. Mt. Vernon, OH 43050. and S. Staats, Dept. Psychology, The Ohio State University Newark, OH 43055

The community surveyed has an especially high unemployment rate of 14.9%. It is predicted that this should lead to a decreased life satisfaction and decreased sense of personal control over one's fate. Locus of control is an important personality variable moderating negative life events. Recent research has substantiated this premise, and this article presents stronger support. A survey was administered to 10 females and 12 males ranging in age from 22 to 55, who had resided in the community for at least 10 years. An analysis of the Reid-Ware Locus of Control and three other measures of satisfaction indicated that women were happier than males (means of 13.3 and 7.6, respectively) and were more internally controlled (means of 10.5 and 15.5 respectively\) The most significant difference between men and women was the fatalistic aspect of Locus of Control,(2.1 vs. 6.08; t (22) = 4.35 $p < .01$). A possible hypothesis is that high unemployment and the intense competition for the few jobs available result in lack of self-confidence and in a fatalistic attitude in males. Cultural stereotypes impose less pressure on females to be employed, allowing them more sense of control.

SECTION M. PSYCHOLOGY
AFTERNOON SESSION - STRANAHAN 107
SATURDAY, APRIL 26, 1986
CAROLYN BENZ, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 INFANT PERCEPTION OF SUBJECTIVE CONTOURS N. Sack & R. Haaf Department of Psychology, University of Toledo, Toledo, OH 43606

Banks and Salapatek hypothesize that infants' visual preferences can be explained by the Contrast Sensitivity Function. Karmel and Maisel also explained infant visual preferences by relating them to contour density. Both of these theories suggest that infant visual perception is based on neural mechanisms which are activated when an infant perceives an object defined by contours of light-dark contrast. For stimuli such as subjective contours no such contrast exists. The research reported here both trained and tested infants on subjective contours. Infants were trained using three sets of inducing elements arranged so that all produced the same subjective circle. Once habituation had been reached infants' were then tested on a stimulus using a fourth set of inducing elements to produce the same subjective circle. Results of this study failed to show that infants perceive subjective contours. While this research was carried out to determine whether infants could perceive subjective contours, continued research is being done to determine under what conditions the perception of subjective contours is possible in infancy.

2:30 SEQUENTIAL RECALL MEMORY IN 5 AND 6 MONTH OLD INFANTS. Denise Arehart 2824 Alisdale #202 Toledo, Ohio 43606

Two studies investigated immediate and delayed recall in 5 and 6 month old infants. Following an anticipation training procedure 48 five-month old infants were cued for recall both immediately after training and after one week. The same procedure was used for 64 six-month old infants. However, recall was tested after one-, two-, three-, or four-weeks.

The apparatus utilized contained four apertures located in each of four quadrants of a target panel. The aperture doors opened (revealing a stimulus) and closed in a predetermined sequence. A ready signal (bell and flashing light) initiated each sequential looking trial. Infant eye fixations to aperture doors were recorded.

Following six training trials and a 60 second retention interval, a signal-cued recall test was given. The aperture doors remained closed and infant fixations were recorded. Fixations were correct if they followed the appropriate training order. During delayed recall, aperture doors remained closed and infant fixations were recorded.

The results demonstrated that on both immediate and delayed recall conditions, a greater than chance number of 5 month old infants correctly recalled the aperture sequences. Also, infants were found to correctly anticipate which doors would open in the delayed recall conditions. These results provide supporting evidence for the robust nature of infant memorial abilities.

3:00 THE EFFECT OF STIMULUS CONTOUR AND ORIENTATION ON 8 WEEK OLD INFANTS' VISUAL PREFERENCES. A. Ellis, M. Coyle, R. Haaf. Department of Psychology,2801 Bancroft St. The University of Toledo,Toledo, Ohio 43606

Karmel proposed a single quantitative measure of stimulus contour (amount of contour) for predicting infants' visual preferences. Others have indicated several variables related to a contrast senstivity function (CSF), such as spatial frequency and orientation. Three experiments were conducted to examine the interaction between stimulus contour and its orientation on the visual preferences of 8 week old infants. In Experiment 1 the infants were presented with 5 square wave gratings in one of three orientations, vertical, horizontal or oblique. On each trial the infant was presented with two stimulus patterns. In Experiment 2 each infant saw 3 square wave gratings in 3 orientations. Preferences were determined by the duration of fixations to the stimulus pattern or a gray screen. In Experiment 3, the stimuli were checkerboard like patterns composed of checks or rectangles. Each infant was presented with either 5 checkerboards, 5 vertical rectangleboards, or 5 horizontal rectangleboards. Infants' responses in all the studies were significantly related to amount of contour. Further research was suggested on the type of orientation present in sine waves and infant visual acuity and preferences.

3:30 A RE-EXAMINATION OF THE EXTERNALITY EFFECT. M. Turkaly. Department of Psychology, University of Toledo, Toledo, OH 43606.

Milewski and others have proposed that young infants below the age of two months cannot discriminate changes within a compound stimulus. This differential responsiveness was

regarded as due to maturation since four month olds were able to distinguish both internal and external changes of stimuli. Salapatek and Kessen found that infants up to two months of age were boundary scanners and research done on face recognition revealed that eyes were detected first and detection of the nose and mouth followed. In this study, using a standard habituation procedure, infants of two and four months were shown stimuli which varied in proximity to the boundary. It was hypothesized that especially the two month olds could be persuaded to search internally if the inner element was touching the edge of the external form. This would explain why infants are biased to the eye region rather than the nose and mouth due to the relative closeness of the eyes to the edge of the face. Results from this study reveal that the younger infants were sensitive to the manipulation of adjacency within a form and differentially looked at the test stimuli as compared to the habituation stimulus.

4:00 EFFECTS OF PRACTICING RELAXATION TECHNIQUES ON COMPETITIVE ANXIETY AND PERFORMANCE OF AGE-GROUP SWIMMERS. Kayla Hughes. 33E. Streetsboro St., Hudson, OH 44236

The purpose of the study was to explore the use of relaxation techniques, as outlined by Benson (1975), as a means of reducing anxiety levels prior to a sport competition situation. Subjects (N=18) were age-group swimmers and were 12 years of age or older. Trait anxiety (SCAT: Martens, 1977) was measured at a practice before relaxation training and at a practice after training. Subjects were matched on the basis of team membership, gender, and trait anxiety scores and then randomly assigned to either relaxation training or fitness training (control) groups. State anxiety measures (CSAI: Martens, 1977) were taken at a practice and meet prior to relaxation/fitness training and at a practice and a meet after relaxation/fitness training. Meet event times in meters/seconds were used as performance measures. A-trait remained relatively stable from pre-training in the relaxation response to post-training. The trait anxiety means were comparable to norms (Martens, 1977). In relation to state anxiety, swimmers who learned and practiced the Relaxation Response did not demonstrate a reduction in A-state as compared to the swimmers who did not learn the Relaxation Response.

4:30 COACTION EFFECTS UPON CHILDREN'S THROWING. M.J.MacCracken, R.E.Stadulis, S.J.Langendorfer. 178B JAR, Akron University, Akron, Ohio 44325.

Previous research (MacCracken & Stadulis, 1984; 1985) using dynamic balance tasks has demonstrated a positive social facilitation effect by coaction upon children regardless of their skill level. The present study attempted to determine if the consistent positive facilitation effects by coaction apply to throwing tasks. Boys and girls (N=26) ages 3 to 12 were tested over 10 trials with a coactor (same gender/age) present and alone (no coactor). Latin square procedures were used to counter-balance potential situation order effects. The throwing task consisted of trying to hit the center of a large (245cm diameter) circular target. Accuracy (distance in cm from the center), horizontal ball velocity (in meters per second from videotape analysis) and movement quality of five components (ordinal rankings using the Roberton Component Category Checklist from videotape analysis of backswing, stepping, trunk, forearm and humerus actions) of the throw were measured. ANOVA indicated coaction resulted in greater velocity ($p=.005$) of the throw than alone. Similarly, Chi Square analysis indicated the children evidenced a higher developmental pattern of stepping when coacting. For boys only, both the forearm and humerus actions were at a higher level under coaction. Regardless of developmental status, coaction resulted in greater velocity of the throw. These results using the throwing task further support the general positive social facilitation effect of coaction in children observed previously in the balance tasks.

SECTION N. JUNIOR ACADEMY
MORNING SESSION - SNYDER MEMORIAL 216
SATURDAY, APRIL 26, 1986
DANIEL W. ELWELL, PRESIDING

8:30 LUBRICATION
Robert Baraona
6803 Regency Drive
Parma, OH 44129

A lubricant is a substance used to reduce friction. In this experiment various solid and liquid lubricants were used to test the following:

1. Measure the coefficient of friction (F) between lubricated surfaces
2. Measure the viscosity of liquid lubricants.
3. Investigate the effects of
   a) Type of metal surface and lubricant on F
   b) Area of contact and lubricant on F
   c) Load and lubricant on F

An inclined plane was used to measure F. A simple falling ball viscometer was used to compare the different viscosities of liquid lubricants. All experiments were conducted in the same environment. Conclusions reached are as follows:

1. Lubricants reduce friction
2. Load does affect lubrication
3. Type of metal surfaces affects lubrication
4. Viscosity is related to a liquid's lubricating ability.

8:45 DO THE PRICES OF SECURITIES ON THE AMERICAN STOCK EXCHANGE MOVE RANDOMLY?
David James 2604 Lantz Road, Xenia, Ohio 45385

Many smaller companies, very important in national job formation, are traded on the American Stock Exchange (AMEX). Daily closing prices for the American Stock Exchange (AMEX) Index were analyzed and tested for randomness. A total of 904 closing readings were collected, giving 903 daily changes. The changes and the percent changes were analyzed and charted. Simulated index readings were randomly generated, and were compared to the actual data.

If the changes were at random, they would tend to follow a "normal distribution" curve. The changes were tested for normality using the CHI Square Test. Only four times in 10,000 would normal samples yield these results, giving strong evidence to doubt randomness. Next, the Wald-Wolfwitz Runs Test was used to check for evidence of non-random "runs" or "groupings" in the sequence of changes. The hypothesis of randomness could be rejected at the 1/10,000 level.

The study briefly explored the importance and implications of these findings. Conclusion: These tests gave us strong reason to doubt that AMEX prices move randomly.

9:00 EXTENSION OF GEOMETRY INTO HIGHER DIMENSIONS
Christopher Allen Grove, 3300 Putnam Avenue
Hamilton, OH 45015

My research deals with extending standard geometry into higher dimensions and making comparisons between geometries of each dimension. Besides specific postulates for particular dimensions, general postulates applicable to all dimensions can be assumed. From these, general theorems can be derived. Definitions are also generalized, so that formulas for areas, volumes, and other quantities can be derived for the higher dimensional equivalents of spheres, pyramids, prisms, etcetera. The close correlation between corresponding theorems shows that geometry can be generalized much farther than has been done previously.

9:15 THE ENVIRONMENTAL IMPACT OF EFFLUENT ON WATER QUALITY OF THE GREAT MIAMI RIVER John Sherman 146 Hartshorn Dr., Vandalia, Ohio 45377

The quality of water in The Great Miami River is a concern from recreation and wildlife welfare to the more immediate threat of contamination of human water supplies. A 3 1/2 mile section of the river was studied. Four specific sites with similar habitat were selected in September, 1984. Macro, micro and chemical analysis have been conducted regularly to date. The section of river being studied has been found to contain two depression zones due to effluent discharges from sewage treatment plants. One of the zones is located in Tipp City and the other in Vandalia, Ohio. Both biotic and abiotic qualities of the water and the surrounding

habitat have been studied. Qualities that were tested include pH, ammonia, temperature, and dissolved oxygen. Other methods of monitoring include The Biotic Index and using algae as a pollution indicator. Extensive observations were taken including algae abundance, depth, substrate materials, current speeds, core samples etc. Experimentations such as mapping the depression zone by tracking suspended solids and studying the effect of specific impurities on algae were conducted. Results obtained were very effective in determining the extent of the pollution impact and possible solutions to the problem. The testing methods used revealed the discharge of effluent to be polluting the Great Miami River. The investigation of how and at what rate does an aquatic habitat recover once effluent discharge has been eliminated, is also considered to be very significant in the understanding of the total pollution impact on the aquatic environment. In November, 1985 Tipp City and Vandalia sewage treatment plants were shut down. A comparative study of pollution impact and recovery rate is under investigation.

9:30 EFFECTS OF RADIATION HORMESIS ON PARAMECIUM BURSARIA Todd F. Gabel, 72 Spring Creek Drive, Westerville, Ohio 43081

The purpose of this research was to study the effects of small doses of radiation on a living organism in an attempt to validate the concept of radiation hormesis. Hormesis is the principle that substances normally causing harmful effects to living organisms can have beneficial effects if applied in small amounts. The idea was tested by exposing Paramecium bursaria to x-ray radiation. The study was conducted by first innoculating a sterile nutrient hay infusion with a stock culture of Paramecium bursaria. After one (1) week of growth, four (4) groups of ten (10) test tubes were innoculated with the culture; cell counts were taken; three (3) of the groups were irradiated (x-ray); and one (1) group was maintained as a control. Three (3) levels of radiation were used including 1 Krads, 3.16 Krads, and 10 Krads, one (1) level per one (1) group. Cell counts were taken on each group on consecutive days after irradiation and percentages of cell reproduction for the irradiated groups were calculated using the control group as the basis of determining the percentage change. The process was repeated using 31.6 Krads and 50 Krads of irradiation. It was found that for each irradiated group the percentage of cell reproduction was greater on days following irradiation when compared to the control groups. It was also determined that greater amounts of radiation produce greater percentages of cell reproduction. What the harmful level of irradiation was not determined and is one area of further study.

9:45 THE EFFECTS OF GIBBERELLIC ACID ON PLANT GROWTH Joel T. Metzler,2790 Rte. 29 W.,Urbana Ohio 43078

Pisum Sativum var. Little Marvel treated with gibberellic acid at a concentration of 100mg./L. had an average growth of .6 inches per day while the controls grew .1 inches per day. Useing the Student's T-test the difference between treatment and control plants was significant at the .05 level.
Phaseolus Vulgaris var. Pinto treated with 10^{-2}m. gibberellic acid solution grew an average of 2 inches per day as did 10^{-3}m.. A 10^{-4}m. solution resulted in .9 inches growth and a 10^{-5}m. solution in .7 inches growth per day. The control plants grew .5 inches per day. The Student's T-test showed the 10^{-2}m. treatment to be significantly different from the 10^{-4}m.,10^{-5}m., and control treatments. The 10^{-3}m. treatment was also significantly different from the 10^{-4}m.,10^{-5}m., and control treatments. There was no significant difference between the 10^{-2}m. and 10^{-3}m. treatments or between the 10^{-4}m.,10^{-5}m., and control treatments.

10:00 RANDOMIZATION OF THE TRIADIC KOCH CURVE: CAN IT BE USED TO MODEL LANDMASSES? Sandra E. Wambold, 539 Stinchcomb Dr. #1, Columbus, Ohio 43202.

The purpose of this study was to determine if an algorithm can be created to randomize the triadic Koch curve to simulate landmasses. The triadic Koch curve was analyzed and a program was developed utilizing an incremental plotter. By stretching the x and y axes, drawings resembling landmasses were produced.

Although this program was based on the use of the equilateral triangle, it was designed so that subroutines incorporating squares, pentagons, and other polygons can be easily added. The program would then randomly select subroutines; it is hoped that the pictures produced will more closely resemble landmasses. Possible applications of this investigation may be found in the field of computer graphics.

10:15 AERODYNAMICS OF AIRFOILS Rodney D. Hartman, 1305 Coonpath Rd., N.W. Lancaster, Ohio 43130

My project's purpose is to determine what type of airfoil would be practical for slow flying aircraft. I started my project by designing a wind tunnel and measuring apparatus that would give near accurate results. Eleven different airfoils, covering a wide range of designs, were made using knowledge of aerodynamics. Each airfoil was made with a span of 6 inches and a length of 4.5 inches. Each airfoil was made using two balsa wood ribs made from 1/16 inch balsa sheet. Spars were made using 1/16 inch by 1/16 inch balsa strips. The airfoils were covered with sheet mylar and were attached to the ribs using heat glue. The airfoils were tested using a balanced apparatus. A 6.3 gram weight was removed, so when the airfoil was being tested it had to lift this weight. The angle of attack could then be set. The airflow velocity was varied by changing the speed of the wind tunnel fans. The voltage to the fans was monitored to compare the air velocity required to lift the 6.3 grams. My most efficient airfoil had a large leading edge and a deeply cambered cross section, similar to that of a bird's wing.

10:30 COMPARATIVE VEGETATION SAMPLING OF A WOODLOT Melinda Whetstone, Rt. 4 Box 166; Van Wert, OH 45891

Vegetation sampling was undertaken in Heistand Woods, section fifty-two in Pleasant Township of Van Wert County, Ohio in September of 1985. This woodlot was willed to the county in 1944 with the requirement that the majority of the woods be left untouched. Sampling was taken in two habitats, a mature forest and a low lying flood plain near Town Creek. The data was then compared to similar data collected in 1980.

Data indicated the dominant species in the mature forest are Carya ovata and Tilia americana. In the flood plain, the dominant species are Acer rubrum and Fraxinus americana. By comparison, data from 1980 shows that Carya ovata and Tilia americana were dominant in the mature forest; and in the flood plain, Acer saccharum, Acer rubrum, and Ulmus rubra were dominant.

Species found in 1980, but not 1985 include Carya tomentosa, Asimina triloba, Quercus alba, and Quercus prinus; new species found in 1985 are Celtis occidentalis, Cornus spp., Crataegus spp., Carya glabra, Cercis canadensis, and Acer negundo. In the comparison of the flood pdain, new species such as Tilia americana, Morus rubra, Carya tomentosa, Acer negundo, and Quercus prinus were found in 1980; new species in 1985 include Fraxinus americana, Carya laciniosa, Quercus palustris, and Juglans nigra.

Relative dominance, relative frequency, and relative density were also calculated and compared for all species.

10:45 METALS CONTACT BRACES: WHAT HAPPENS? Christine A. Jumper. 1700 Radcliffe Rd, Dayton, OH 45406.

The purpose of this project was to find the cause of the tingling sensation experienced when certain metals contact braces and the tongue. The first step was to see if there was any measurable phenomenon which correlated to the presence of the sensation. An electrical voltage was successfully measured by placing various types of metals into the mouth, and attaching them to a volt meter. Voltages as high as 0.65 volts were recorded when using zinc. This same test was done using braces material and a saline solution instead of the mouth, and voltages as high as 0.75 volts were recorded when using galvanized steel. The next step in this project was to test other individuals who wore braces to see if they received a tingling sensation. Each subject tested six different metals and rated their tingling sensation on a scale from 1-5 (5 being the greatest sensation). They all rated galvanized steel and zinc at 5. At the end of my experiment I found that what I had been creating was a weak battery formed with the metal, braces and mouth chemicals. The tingling sensation was in direct correlation with the amount of voltage between the metals and braces material.

SECTION N. JUNIOR ACADEMY
AFTERNOON SESSION - SNYDER MEMORIAL 216
SATURDAY, APRIL 26, 1986
DANIEL W. ELWELL, PRESIDING

12:30 SECTION BUSINESS MEETING

1:15 EFFECTS OF CHEMICALS ON ROOT GROWTH AND GEOTROPISM Mirpuri, Prakash L., 724 North Main Street, Bowling Green, Ohio 43402

This project is concerned with the effects of gravity and chemicals on geotropism and root growth. Corn seeds, soaked in water over a period of twenty-four hours, were placed uniformly on moist paper towel. After the seeds sprouted, the petri dishes were divided into four sets, each containing four petri dishes. In each set, two of the dishes contained 'capped' roots and the other two contained 'decapped' roots. Of the four sets, one was used as a control. In each of the other sets, three different chemical salts, calcium chloride, potassium chloride and sodium chloride were applied to the top and bottom of the root tips of both capped and decapped roots. The solution of the chemicals was prepared by dissolving one gram of solute into ten millimeters of water, thus creating a 0.1% concentration w/v. The petri dishes were inverted at ninety degree angles every twenty-four hours. The effects on root growth and geotropic response were then studied. Results showed that different chemicals affected root growth and geotropic response in different ways.

1:30 THE EMBALMING OF EGYPTIAN MUMMIES
Blythe A. Howard
30 Roosevelt Drive
Springfield, Ohio 45504

As a result of my research, I have gained a lot of valuable knowledge about the tombs and embalming of Egyptian mummies. When I probed into the world of embalming, I noticed how advanced the techniques seemed for such ancient times. There are many steps to complete when embalming a mummy. The main focus of my experiments was the sixth step; dehydration of the corpse. This process has aroused more controversy among scientists than any other step. There are three theories of how the corpse was dehydrated. The first, being dehydration through fire, the second being dehydration by limestone, and thirdly, the natron theory. After extensive testing on all three theories, I concluded that dehydration through a natron substance was a very effective method of preserving a corpse in ancient times. Although my conclusion is realistic, I feel I must add the fact that natron has been discovered in sachets and jars in most embalmer's workshops. Natron also has been found in wads of cloth used to stuff many corpses.

1:45 SOLVENTS VARIABLES IN CHROMOTOGRAPHY Karen Schwenk - 7090 Kirby Avenue N.E. North Canton, Ohio 44721

Extracts of Spinacia oleraea, containing plant pigments were used to demonstrate the effects of various solvent systems in separating pigments through thin-layer chromatography. Volume-to-volume ratios of acetone, chloroform, and petroleum ether were varied as the pigment bands separated due to molecular weight and polarity. Carotenes, the lightest pigments, almost always had the highest Rf values. Acetone only produced lower Rf values for carotenes than for the chlorophylls. Duel combinations of 50:50, 70:30, and 30:70 (v:v) ratios of chloroform:petroleum ether, chloroform:acetone, and petroleum ether: acetone were compared with standards of chloroform, acetone, and petroleum ether by themselves. The 70:30 (v:v) petroleum ether: acetone solution produced the best separation. Eight different bands were identified. Chlorophyll a and b however were not clearly separated. Final ratios of triads, v:v:v of petroleum ether, acetone, and chloroform gave the best separation with a 70:25:5 (v:v:v) solution respectively. Eleven clearly separate bands were identifiable.

2:00 MAGNETOHYDRODYNAMICS EXPERIMENTING WITH THE VARIABLES. Phillip Savage Southwestern High School, Route 2, Patriot, Ohio 45658

Plasma traveling through a magnetic field generate an electric load. While traveling through the field the gas is seeded with an Alkali metal to speed up ionization. The energy produced by this method is 20-25% more efficient than conventional steam power. Improvements on electrode life and the tapping of the plasma flow have been accomplished by testing different metals for corrosion and heat resistance and conductivity.

2:15 THE EFFECT OF ACIDITY ON GROWTH AND ANTIBIOTIC PRODUCTION OF SOIL FUNGI FROM DIFFERENT GEOGRAPHICAL LOCATIONS. Kyle Thompson, 11596, Gettysburg Darke Co. Rd. New Paris, OH 45347

Soil samples which might contain fungi with certain antibiotic characteristics were collected from random geographical locations of the world. Fungi then were isolated from each sample into a pure culture. Each fungi seperated was then streak tested against Rhodotutula rubra, Escherichia coli, and Bacillus subtillis to test for antibiotic production. The soil fungi exhibiting antibiotic characteristics were then tested for growth on agar plates in which the pH had been adjusted to pH values of 4, 6, 8, and 10. The pH of the original soil samples was determined. An analysis of the resulting experimental data was made. The experimental results indicated an increase in the number of fungi possessing antibiotic qualities in soil samples with pH ranges from 6.0 to 7.9 and 4.0 to 4.7.

2:30 DOES AGING INFLUENCE HUMAN CORRECTNESS IN MANUAL TASKS? Chris L. Amerson
2924 Chestnut
Toledo, Oh. 43608

The purpose of this study was to determine if age has any influence on human correctness in psychomotor performance. Correctness was defined as preciseness and accuracy in a task. Seventy volunteers, ages ranging from approximately twenty to sixty-five, participated in this study at the University of Toledo and Benchmark Technologies. Each volunteer was tested in three areas: mental aptitude/categorizing ability, finger dexterity, and two-hand coordination. A standard categorizing test was given to test mental aptitude, an adding machine was utilized to test finger dexterity, and an Etch-A-Sketch was utilized to test two-hand coordination. The results of this study show that there is a correlation between age and the amount of time necessary to complete both of the manual dexterity tests. A correlation also exists between performance on the categorizing test and performance on both the manual dexterity tests. No correlation resulted between age and the number of mistakes on either of the manual dexterity tests.

2:45 MEASUREMENT OF ABSOLUTE REFLECTANCE UTILIZING THE INTEGRATING SPHERE. RIDDELL/James IV. 3254 Ferry Rd. Bellbrook, OH 45305.

The purpose of this investigation was to develop an apparatus to measure absolute reflectance of paint samples in the visible spectrum. The difference in reflectance that existed between paint samples irradiated with simulated sunlight versus artificial light was investigated. An integrating sphere was built out of fiberglass and epoxy with a Cadmium Sulfide light detector to measure the absolute reflectance of these samples. The detector was calibrated in terms of resistance versus the amount of light incident on its surface. The light source consisted of a small auto light bulb at the end of a blackened tube. This source was focused onto the sample with a biconvex lens. To simulate sunlight, a bluish filter was placed over the source. In the first set of experiments it was proven that specular samples were more reflective under sunlight than artificial light. In a second set of experimentation, reflectance of rough versus smooth surfaces was compared using gray and black military camoflage paints. From experiment I, yellow was confirmed to be the best color for school buses because of its high reflectance percentage. Experiment II proved that rough surfaces are less reflective than smooth for low reflectance on combat aircraft. However, only rough black was notably different than its smooth counterpart.

3:00 HOW IS HEALING AFFECTED BY ZINC AND VITAMIN C? Suzanne Voisard. 1072 Grange Hall Road, Dayton, Ohio 45430.

After research on the healing process, factors involved, zinc, and vitamin C was completed, the hypothesis was determined: Supplemental daily doses of zinc, vitamin C, or both will increase the rate of healing of surgical incisions in the

first eight days. Sixteen rats were given skin lesions under surgical conditions. They were put in four groups: Control, zinc, vitamin C, and both. They were given daily supplements in their water. They were housed separately in a totally controlled environment. Their weight gain and water intake were recorded daily. The tensile strength of each group was tested at days 2, 4, 6, and 8 on different animals. The "tensilometer" was devised to measure the pounds of stress needed to pull apart the wound. The zinc significantly aided in wound repair - increasing the tensile strength by 1 10/32 of a pound. The vitamin C was also beneficial. Both supplements given together seemed to have a slight effect but was inconclusive. No differences were seen due to the weight gain or age of the animals. It is apparent from the data that it takes a few days for the body to reach the higher levels of nutrients and then utilize them for wound repair.

3:15 THE DEVELOPMENT OF A NEW TEST FOR FIBRINOGEN USING ELISA.
Sheri Beaverson, 21252 Co. Rd. #65
Belle Center, Ohio 43310

A new method for the testing of fibrinogen was developed by use of an enzyme linked immunosorbent assay (ELISA).

This test was performed in a ninety-six well plate which was absorbed with anti-human fibrinogen and then blocked with egg albumin. Diluted serum samples were applied and binding was allowed to occur. A conjugate of anti-human fibrinogen and alkaline phosphatase was added. After an incubation period of one hour, a substrate of p-Nitrophenophosphate was then added for color development. The color change was measured with a MICRO-ELISA spectrophotometer at intervals of two to twenty minutes.

There was a good correlation of known to unknown samples. This test may prove to be very promising in clinical applications.

3:30 EFFECTS OF DOPAMINE ON EPINEPHRINE-INDUCED PLATELET AGGREGATION IN HEART SURGERY PATIENTS
Ellen M. Van Otteren, 4804 Sunbury Road, Westerville, Ohio 43081

Platelets are fragments of cytoplasm which are responsible for the clotting of the blood. They can be activated to aggregate by many chemicals. One such chemical is epinephrine, which occurs naturally in the body and is commonly called adrenalin. Dopamine is a stabilizing drug given to heart patients to strengthen the heartbeat after surgery. The hypothesis of the study is that Dopamine inhibits epinephrine-induced platelet aggregation and may increase the risk of internal hemorrhaging in heart surgery patients. The experiment was completed several times using an aggregometer to measure the maximum percent aggregation of several tubes of platelets in plasma. Dopamine was added first and the epinephrine about three minutes later. From graphs printed by the aggregometer, it became obvious that the higher the concentration of Dopamine, the lower the amount of aggregation. This may have been because Dopamine, chemically similar to epinephrine, blocked the epinephrine receptors. However, by studying the doses and pharmacokinetics of Dopamine, the concentration in the body is probably not great enough to cause a measurable difference in platelet aggregation. A local effect should be watched for, though.

3:45 THE PPEVALENCE OF CHROMOSOMAL ABNORMALITIES IN COUPLES WITH MULTIPLE MISCARRIAGES.
Joel Moll, 4612 285th Street, Toledo, Ohio 43611

A cytogenetic analysis was performed on patients referred to the Medical College of Ohio for multiple miscarriages. Chromosomes of each patient were examined for the prevalence of structural anomalies for the purpose of comparison to the general population. Translocations, polymorphisms, aneuploidy, and breakage were all found to be at a significantly higher rate in the recurrent abortion population. An association between aneuploidy, a cause of first trimester abortions, and abnormal size Y chromosome was detected, indicating that the polymorphism of the Y chromosome may be a deterrant to successful reproduction.

4:00 DO THE EFFECTS OF SOUND CAUSE HYPERTENSION
Douglas G. Kohlrieser
57 Gabriel Street, Vandalia, Ohio, 45377

A limited cross section of the population was tested in various age brackets. This experiment was to see if types of sound raise vital signs to the extent of hypertension. Sounds used were clasical, rock, no sound, and everyday enviromental sounds. After all data had been averaged by computer tabulation, the results were as follows:

Enviromental Sounds - 121/68
Rock music - 119/67
Clasical music - 118/68
No music - 117/68

Comparisons were made between the following persons: Black and white, overweight and underweight hypertensive and normotensive, elderly and a young person Concluded that (on the average) everyday enviromental sounds and rock music cause hypertension. Clasical music raises the vital signs, but not to the extent of hypertension. No sound maintains a normal vital signs reading.

4:15 THE EFFECTS OF PLANTVAX TECHNICAL AND BAYLETON 25 ON VERTICILLIUM ALBO ATRUM.
Ben Pyles. 11086 Co. Rd. 104, Belle Center, Ohio, 43310.

Verticillium albo-atrum is a soil-borne, plant pathogentic fungus that causes a vascular wilting disease in over three hundred species of plants. It enters a host by invasion of the roots then travels up the xylem. The symptoms of this disease include sudden wilting and loss of leaves, lower branch dieback, and in many species, death.
This research was conducted to determine if Plantvax Technical and Bayleton 25 can be used as control agents for V. albo-atrum. Studies were conducted in vitro, in laboratory experiments, and in field studies. In vitro studies were to see if the chemicals directly inhibit the growth of V. albo-atrum. Both laboratory and field studies were to determine if Bayleton and Plantvax can be used to control Verticillium spread into the tomato plant. Preliminary findings indicate that these chemicals may control the spread, and further studies are warranted.

4:30 ROBOTICS: AN EXERCISE IN DESCRIPTIVE GEOMETRY FEEDBACK AND CONTROL. E. John Jumper. 1700 Radcliffe Road, Dayton, Ohio 45406.

The purpose of this project was to explore the three components of robotics, descriptive geometry, feedback and control, by designing and constructing instrumentation to drive and control a robot arm. The computer system used was the Radio Shack Color Computer. Rather than building a robot arm from scratch, a Radio Shack ARMATRON was chosen for use in the project. It was determined that the simplest method of feedback was to sense the angles at which the arm joints were bent. To do this, I placed potentiometers at each joint. The potentiometer wiper voltages were run into the computer analog-to-digital converters through the four joystick ports; the 5 volt pin available at the ports was used to apply the voltage across to potentiometers. Then, by use of software, I calibrated the potentiometer readings to convert the voltages to angles of joint rotation. Using descriptive geometry, these angles were then used in the program to compute the X,Y, and Z coordinates of the end of the robot arm. The robot arm was then extensively modified to be controlled using separate motors for each movement rather than the original, complicated single-motor arrangement. Finally, integrated circuits were used to build a decoder to covert computer parallel-port outputs to motor on/off commands to control the arm, thus creating a feedback-and-control closed loop.

4:45 THE EFFECTS OF RED/FAR-RED REVERSIBILITY ON THE GERMINATION OF GRAND RAPIDS LETTUCE SEEDS
Mark A. Gillespie
4601 Silver Oak St.
Dayton, Ohio 45424

In this experiment, Grand Rapids lettuce seeds were illuminated with red and far-red light. The results show that red light increases seed germination, while a short illumination period with far-red light decreases germination. When the far-red light illumination period is extended, germination increases to the same level or percentage as that

achieved with the red light. Prolonged illuminations with both red and far-red light yield equivalent, very high germination percentages. The conclusion is, red light converts phytochrome pigment to the active, Pfr form; while short duration exposure to far-red light can reverse phytochrome to the inactive, Pr form.

5:00 READING COMPREHENSION AND HOW IT IS AFFECTED BY DISTRACTION. Amy Wolford, 103 Elm Street, Walbridge, Ohio 43465.

Six different tests were given to 46 second grade students at Walbridge Elementary School, Walbridge, Ohio to see what their comprehension level was and how it was affected by distraction. The distractors used were television and radio. The children comprehended best when they could read a story alone while it was completely quiet in the room, and they did the worst when they were distracted by television or by a song with a rapid beat on radio. It was concluded that children read and comprehend a story best when it is quiet and they read to themselves, because this way they are able to read at their own pace and understand more. The other three tests proved children comprehended fairly well when a story was read to them, when they were following along while a story was being read to them, and also when a story was read to them while a slow, easy-listening song was playing in the room. This shows three other methods teachers can use to get children to comprehend other than just letting them read alone all the time.

5:15 THE EFFECTS OF WHOLE-BODY HYPERTHERMIA, CHEMOTHERAPY, AND COMBINED WHOLE-BODY HYPERTHERMIA AND CHEMOTHERAPY ON NORMAL ANIMAL TISSUE. Jill E. Thomley, 3411 Worley Pl. Toledo, Ohio 43608

In phase one of this study, rats were given whole-body hyperthermia at 40-41 degrees Celsius for 20, 40, 60, 90, 120 or 150 minutes. No deaths were recorded during the four week observation period following treatment. Rats were also given hyperthermia at 41-42 degrees Celsius, employing the same procedure. At 20 minutes, a 75% survival rate was recorded. At 40 minutes, survival dropped to 0%. All deaths that occurred were within twenty-four hours of treatment. In phase two of this study, rats were injected with Adriamycin, a common chemotherapeutic agent, at doses of 5 mg/kg, 10 mg/kg, 15 mg/kg, 20 mg/kg, and 25 mg/kg. At doses of 5 mg/kg and 10 mg/kg, no adverse effects were noted. At a dose of 15 mg/kg, a 50% survival rate was observed; at doses of 20 mg/kg and 25 mg/kg survival dropped to 0%. All deaths that occurred were within eight days of treatment. In phase three of this study, rats were treated with hyperthermia at 40-41 degrees Celsius with a dose of Adriamycin at 10 mg/kg immediately prior to treatment. Rats given hyperthermia up to 40 minutes experienced a 75% survival rate. At 60 minutes the survival rate was 50%, dropping to 25% for 90 minutes and 0% for 120 minutes and above. All deaths that occurred were within ten days of treatment. In all cases where Adriamycin was used, death was caused by cardiotoxicity and nephrotoxicity.

SECTION N. JUNIOR ACADEMY
POSTER SESSION - STUDENT UNION, INGMAN ROOM
SATURDAY, APRIL 26, 1986

Board A @ 2:00 PM DESIGN AND CONSTRUCTION OF A COMPUTER-CONTROLLED ANOMALOSCOPE. Allen W. Ingling, 4483 S. Section Line Road, Delaware, OH 43015.

An anomaloscope is an optical instrument used for the diagnosis of red-green color blindness and color anomalies. A new design, using computer control instead of optical control, reduces cost while increasing ease of use, flexibility, and performance.

Observers match halves of a yellow-red/green bipartite field by adjusting the intensity of the yellow side and the red/green (R/G) ratio of the other side. After the observer adjusts the halves of the bipartite field until they match, the computer records the intensity and the R/G ratio for use in diagnosis.

Linear control of light intensity is achieved by directly regulating tungsten bulb sources and monitoring the sources with linear photodiodes. The computer functions as the comparator in a servo system, adjusting light intensity according to the observer's settings, and maintains the R/G mixture at constant luminance. A triac control interface and a digital photometer were constructed to allow the computer to adjust and monitor lamp intensity.

Board B @ 3:00 PM A DETERMINATION OF INCREASED SOLUBILITY OF Ag_2CrO_4 IN THE PRESENCE OF SELECTED FOREIGN IONS. Mary Mederski. Perkins High School, 3714 Campbell St. Sandusky, Ohio, 44870.

A solubility-product constant, Ksp, is accurately calculated by considering both the concentrations of the ions and their activities. In the solubility equilibrium of:

$$2\ Ag^+ + CrO_4^{-2} \rightleftharpoons Ag_2CrO_4\ (s)$$

the Ksp is:

$$[Ag^+]^2\ [CrO_4^{-2}]\ (\gamma+)^2\ (\gamma-)$$

where $\gamma+$ represents the activity coefficient of the silver ion and $\gamma-$ the activity coefficient of the chromate ion. The effect of foreign ions on a solubility equilibrium can not be accurately determined soley by applying LeChatelier's principle. The ionic strength of the above system was calculated to predict this salt effect in the presence of Na^+ and NO_3^- ions. As the ionic strength of the $NaNO_3$ was increased, the solubility of the solid also increased. But $NaNO_3$ at a concentration greater than 0.1M had no effect on the solubility of the precipitate. My data indicate the necessity to consider activity coefficients in the calculation of Ksp. As the concentration of an inert salt was increased, the activity coefficients approached unity.

Board C @ 4:00 PM THE IN VITRO PROPAGATION OF THE AMERICAN CHESTNUT. Kathleen DeVault. 7157 Road 153, East Liberty, Ohio, 43319.

The American chestnut, Castanea dentata, has been nearly eradicated by the chestnut blight, Endothia parasitica. Many scientists have been working with both the chestnut and the blight for a number of years. Keys and Cech have been working with chestnut embryoes: they have been able to induce leaf and stem growth but not root growth. This project deals with the evaluation of media for rooting of this plant.
The root media developed by Keys and Cech has not proven to be successful. A modification in which the nitrates are reduced by half proved not to be successful. In hope of bringing about more shoot production, the shoots were placed in callus media before being placed in shoot media. This also proved unsuccessful.

Board D @ 2:00 PM

THE SPECTROSCOPIC CHARACTERIZATION OF EPOXY-AMINE SYSTEMS

Debbi A. Czerniawski
15806 Normandy Avenue, Cleveland, Ohio 44111

The polymer, an epoxy-amine system, is composed of the epoxy Tetraglycidyl Diamino-Diphenyl Methane(TGDDM) and the amine Diamino-Diphenyl Sulphone(DDS) whose concentration ranges from 10 to 40 percent to relative amounts of TGDDM. The Fourier Transform Infrared Spectrometer(FTIR) was used to produce readable frequency spectra. Qualitative analysis was achieved by comparison of the various system and component monomer spectra with attention to the peaks produced by primary amine, epoxide and ether groups. Quantitative analysis was accomodated by two aromatic rings found in the center of each monomer. These are stable, generally non-reactive and can be used as reference points in normalization for subtraction of spectra to find exact loss or gain. TGDDM and DDS are tetrafunctional monomers. TGDDM has epoxies at its reactive sites which decrease with the extent of reaction. These have no preference in reactivity and bond randomly. The DDS primary amines are very reactive more so than its secondary amines which have a reactivity ratio of only approximately 0.20. It is seen in the qualitative comparison that there is a definite decrease in both the primary amine and the epoxy as the DDS concentration increases. As the monomers reacted in polymerization, the epoxides at the reactive sites of the TGDDM and the primary amine at the reactive sites of the DDS disappeared. The amounts of ether groups, products of a side reaction with DDS, increased with DDS.

Board E
@ 3:00 PM

THE SEAMLESS IMPLANTABLE ARTIFICIAL HEART INCLUDING DRIVE SYSTEM AND PORTABLE DRIVE UNIT

Michael Yeager, 6209 Waterloo Rd., Atwater, Ohio 44201

In the development of a seamless implantable artificial heart including drive systems, there are several problems to be overcome.

The first major difficulty is designing, then constructing a valve that will fit the heart and operate smoothly, easily, and last for long periods of time under the pressure required.

Another aspect which must now be considered is the production of a seamless artificial heart to reduce the risk of malfunctions.

The next problem being to develop a portable drive unit that is intergradable with the heart, which will make the heart function but small enough to make the patient able to move about. After development of the portable drive unit it must be perfected, and also the stationary unit already developed must be improved upon.

The final problem is to produce the artificial heart in different sizes to fit men, women, and children.

Board F
@ 4:00 PM

YOGURT CULTURE VARIATIONS BY TEMPERATURE AND INNOCULATION.

Bunny Hammersley 650 Hallmark , Bolivar, Ohio 44612

A commercial yogurt, whole milk, and homogenized milk were innoculated with Bulgarian yogurt culture. Fermentation was produced. The cultures were suspended in a.)potato-dextrose agar and b.) EMB agar. The fermentation process occured at a.)room temp b.)10°c c.)55°c. Samples were taken at ten day intervals for forty days and slides were prepared with a gram stain. Gram + and Gram - were identified and acid content determined. Bacterial cultures were identified as a.)streptococcus b.)sarcina c.)lactobacillus bulgaricus d.)coccus.
Only slight variations were found in any cultures.

Board G
@ 2:00 PM

COMPARATIVE TRANSFORMATION OF BACILLUS THURINGIENSIS

Melissa Kuaile, 3054 Twp. Rd. 182, Bellefontaine, Ohio, 43311.

Bacillus thuringiensis 4060 M56 will be genetically transformed by DNA (deoxyribonucleic acid) extracted from Bacillus subtilis. B. thuringiensis 4060 M56 will then be transformed by DNA from M56 previously transformed by B. subtilis. The number of cells transformed per ug/ml of DNA will be compared. It is anticipated that the use of DNA from previously transformed cells will yield a much higher rate of transformation.

Board H
@ 3:00 PM

THE EFFICIENCY OF A DIRECT CURRENT MOTOR-GENERATOR

by Tim Vogt
4052 Forest Ridge Blvd.
Dayton, Ohio 45424

In this experiment, two 3-volt motors were attached to each other, rotor to rotor. One motor was run, turning the other one as a generator. The power input to the motor was recorded as was the output of the generator. These two data were compared to find the efficiency of a direct current motor in the role of a generator compared to in the role of a motor. The peak efficiency, which occurred before maximum input power was reached, was slightly above 21%. Thus, a direct current motor is much less efficient in the role of a generator than in the role of a motor.

Board I
@ 4:00 PM

THE EFFECTS OF HEAT RETAINMENT IN AN UNDERGROUND HOME COMPARED TO A CONVENTIONAL HOME

Shawn Pierce 4100 Waterloo Road
Randolph, Ohio 44265

In order to demonstrate the advantages of an underground home, it is most important to keep in mind that the ground stays at a constant fifty-five degrees Fahrenhit. Secondly, if the ground stays at a constant fifty-five degrees, than it is not likley that the interior of the house will be at fifty-five degrees mostof the time. Thirdly, a conventional home does not have the ground to give insulation. Thus, the home would not have the constant temperature resulting in higher heating and cooling bills.

During the various times throughout the day, the sun is at different angles, possibly resulting in a mild change in the interior temperature. In a conventional home, the sun would not heat the home as fast as in an underground home. In the winter, it takes longer to heat a conventional home because of the loss of heat through structual design.

Through research, moderate changes in temperature were discovered in a five minute span, there was a moderate temperature change due to location and structure.

Board J
@ 2:00 PM

WHAT ARE THE EFFECTS OF PHYSICAL AND MENTAL STRESS ON BLOOD PRESSURE?

Michelle Matejka
7012 Clement Ave. Cleveland, OH 44105

Blood pressure is the force exerted on the walls of an artery. It is measured with a sphygmomanometer. Hypertension, occurring when blood pressure is abnormally elevated, is the most common and most important disease of the circulatory system. Hypertension can increase with excercise, emotional stress, age and obesity. Some common causes of hypertension are smoking, tension, too much salt, and obesity. Common medical preventions are diuretics and vasodilators. Natural preventions of hypertension are a low salt diet, weight control, relaxation, getting more calcium and stop smoking, Diseases caused by hypertension are renal failure, stroke, heart attack, heart failure and apoplexy. When the cause of hypertension is uknown it is called essential hypertension. When hypertension gets worse it is called malignant hypertension. Hypertension is a serious and sometimes fatal disease if not treated.

Board K
@ 3:00 PM

SCHIZOPHRENIA AND ITS EFFECTS IN HIGH SCHOOL STUDENTS.

Presented by Jill L. Dyer. 1649 Merrydale Road, Springfield, Ohio 45503

Through my paper I will try to define the term SCHIZOPHRENIA, present its background, show the four main types of the disease which are simple, paranoid, hebaphrenic, and catatonic. I will also discuss the probable causes for the disease which will include the theories that SCHIZOPHRENIA is inherited, that a gene weakness is to blame, and the possibility that it is linked to a disorder in the blood. I will also discuss the possible cures for it which include the treament of the blood through dialysis, treatment with drugs, and psychotherepy. I will also try to prove my hypothesis: SCHIZOPHRENIA is highest among the group of seniors that I tested. I will also show the relationship between the four grade levels on schizophrenic tendencies.

Board L
@ 4:00 PM

PLANARIA

LaTania Sci 2311 Banyon Dr. Beavercreek, OH 45431

Planaria, a member of the phylum platyhelminthes, are noted for this incredible ability to regenerate lost parts and are becoming more popular for gaining knowledge through cannibalism.

After studying their various internal systems an senitivites, I was better prepared to begin my more serious work.

I preformed the cannabalism test with a self constructed and engineered maze. To begin, I divided a group of planaria into two groups. Group A was put through the maze until they had comprehended the pattern that had been taught, while group B, the uneducated group, carried on the normal daily activities of a planarian. I then fed group A to group B. After testing group B through the maze, it was concluded that approximately 42% of the planaria gained the knowledge that had been intended.

To test their regenerating powers, I grouped nine planaria equally into class A, B and C. Each individual class I cut in a specific pattern. Placing the planaria in the proper growing environment, I regularly checked their progress. When a class was fully developed, I would record the average time. I concluded that because of it's ability to regenerate the fastest and with the most accuracy, the anterior end must contain the system that allows the planaria to regenerate.

Board M
@ 2:00 PM

CAN MAN LIVE IN SPACE?

Tom Newman
P.O. Box 362
Lynchburg, Ohio 45142

The first true move from the earth has at last begun for the U.S. and its friends. The date set for the completion of a space station is 1994. It will orbit above the earth, 308 miles, for 20 or 30 years. Their goals are to exploit the unique environment of space for commercial and scientific gain and to support far-flung exploration of the moon and other planets. Critics remain uneasy, fearing it will be a delay-plagued, fund-consuming project

like the Space Shuttle. But NASA is trying to avoid that possibility by spending years on design before building anything. The station should cost about $8 billion spread over seven years; NASA hopes to get another $2 billion from other countries.

Solar power is the answer to electrical power and thermal control. It would have to generate sixty-five to one-hundred kilowatts, so NASA designed a gallium arsenide cell that is twice as efficient as silicon cells. Oxygen could be supplied by means of plants, chemicals, and bringing it up in cylinders. Water could be brought up in tanks. Attitude control will be kept by the use of rocket thrusters. Waste removal could be done by lithium hyroxide. The needs can be fulfilled; the main problem is finding the most efficient methods.

Board N
@ 3:00 PM

Is There Life Before Birth? Gloria Lauderbaugh
232 Eastern Ave. New Lexington, Ohio 43764

Although it is a controversial issue, there is a growing wealth of scientific research that indicates undeniably that life begins at the moment of conception. It would therefore follow that abortion is the denial of the unborns basic human right to life.

Very early in the life of the fetus there is a regular heart beat, which is a legal sign of life. Brain waves can be recorded. Fingerprints exists, these are all signs of a legal identity.

While living in the womb, the fetus reacts to sound, touch, and can cry. He can suck his thumb, react to pain, and move purposefully.

Potential life or viability (which means "capable of living") begin at the moment of conception. The value of life cannot be measured in terms of its worth or value to society. Life is precious, and must be respected.

With these facts and others in mind, it is difficult to argue that anyone has the right to purposely terminate a pregnancy.

Board O
@ 4:00 PM

THE AUTOPSY - Erica Alexander, 5361 Abernathy Rd., Lynchburg, OH 45142

If a family member was killed and there was no clue why, wouldn't you want to know how the crime was committed, how he was killed, and who killed him? An autopsy could help you find the answers. The purpose of an autopsy is to determine the cause of death. An autopsy will be done if the next of kin requests it, but the coroner has the right to perform an autopsy without permission from the family.

The autopsy is performed by a forensic pathologist. The pathologist first examines the exterior of the body. Any abusive or identifying marks will be listed. X-rays are then made of the entire body. Any objects that are picked up are listed with their identifying number, size, and the way it can be removed. If abnormalities are found, externally or internally, photographs are taken.

The internal organs are examined by making an incision from the neck to the symphysis pubis in the lower abdomen. Each organ is removed, weighed, and its size, shape, and consistency are noted. The organs are then examined for rips, bruises, and indication of disease. A small portion of tissue from each organ is removed for microscopic study. If it is necessary, the throat, mouth, and neck may be dissected. A total autopsy includes removal of the brain. It is inspected for brain tumors and blood vessel abnormalities. So you see, the examiner has an arduous task to perform, but the reward is the knowledge gained.

Board P
@ 2:00 PM

OPTIMAL STRATEGIES IN THE TWO-PERSON ZERO-SUM SIMULATIONS OF HUMAN INTERACTIONS

J. Scott Wise
PO Box 462
Powder Springs, Ga. 30073

A classical Game Theory two-person zero-sum game entitled "Prisoner's Dilemma" is used extensively to describe the interactions between people. In prisoner's dilemma, a player's score is a function of his or her strategy in cooperating with or antagonizing the opponent. This simple game is used to evaluate possible strategies in business, social science, and war-gaming. Two major world-wide competitions have been sponsored by Dr. Axelrod, in which computer scientists, game theoreticians, and mathematicians proposed strategies which Axelrod evaluated against each other. He found that of all the strategies proposed, a simple procedure called "Tit-for-Tat" seemed to be the consistent winner. To evaluate Tit-for-Tat against a variety of other procedures, a simple computer program was developed which plays 800 rounds of the prisoner's dilemma game rapidly evaluating one strategy against another. Scores for each strategy were developed and compared. Of the strategies analyzed so far, Tit-for-Tat remains the best. Continuing work will attempt to evaluate a very large number of strategies in an attempt to empirically prove that Tit-for-Tat is best against all possible strategies.

Board Q
@ 3:00 PM

THE EFFECTS OF COLORED LIGHTS ON PLANT GROWTH

Jimmy Croy
3549 Tremaine Rd.
Columbus, OH 43232

This project was designed to study the effects of different wavelengths of light on the growth of bean and radish plants. The temperature, moisture content and amount of light were held constant. Plant growth, total height and rate of growth were also observed and varied with growth media, that is, soil, vermiculite, and plant food. This information was recorded on charts and graphs with daily readings of plant growth to determine the best possible environment and lighting for plants. It was determined that colored filters are better for growing plants than natural sunlight. The plants grown with red light (in a mixture of vermiculite and plant food) showed the greatest change verses the control rate of growth. I feel that researching this information will help in the fields of agriculture, horticulture, floriculture, and greenhouse management.

Board R
@ 4:00 PM

PREPARATION AND CHARACTERIZATION OF ETHANOL Dawn Lee Rymer Rte 1 Box 194
Little Hocking, Ohio 45742

The objective of my experiment was to prepare pure ethanol by fermentation and purify it by distillation. The corollary objective was to obtain pure 95% ethanol in a single distillation.

The ethanol was prepared from fermented blackberry juice and distilled using a simple still composed of a round bottomed flask, a glass col heating mantle with rheostat, glass bead packed distillation column, a water cooled condenser and a receiver. Three distillations were carried out; one normal, one with cornstarch packed above the glass beads, and one done normally but the ethanol was purified by slurrying the distillate with cornstarch. The purity of the ethanol was determined by refractive index, using a graph, standards, and a commercial refractometer. Using a pycnometer, where the specific gravity was plotted against concentration, the purity of ethanol where cornstarch was used was higher than my 95% standard as opposed to the 87% from a simple distillation.

A test with permanganate to determine unsaturated impurities whowed that the cornstarch also removed unsaturates while the simple distillation was only partially effective.

Board S
@ 2:00 PM

AGRICULTURAL DRAINAGE,
AN EROSION CONTROL METHOD
Jodi S. Hassan
6280 Co. Rd. 95 Rt. 1 Ada, Ohio 45810

For adequate agricultural drainage both surface and subsurface; water must be drained from the land at rates which will not harm crops and soils.

Subsurface, or tile drainage, has its limitations on how much water it can take off a field. Therefore to obtain the maximum conservation benifits; surface drainage is needed also.

Surface drainage pulls the drainage systems together by taking the excess water off the field that the subsurface drainage system could not.

The two drainage systems working together help in preventing erosion. Because of the controlled drainage pathways water is less likely to form unwanted gullies in the field; which is one major cause of erosion.

This measure in preventing erosion has been proven effective by increasing crop yeilds, longer growing seasons, and even through more efficient operation of farm machinery.

Board T
@ 3:00 PM

THE SPACE SHUTTLE AND HOW IT WORKS
by J. Spencer Rezkalla, 241 S. East St., Box 343, New Holland, Ohio 43145

The Space Shuttle is the world's first re-usable vehicle whose purpose is to ferry payloads and people into

space. It is truly a remarkable spacecraft when we consider how it is launched into space and the successes of its missions. Where does the Shuttle get its power to accomplish all of its tasks? Most of the Shuttle's electricity is produced by fuel cells which change chemical energy directly into electricity. The Shuttle has three main fuel cells which generate 28 DC volts powered by hydrogen and oxygen. As long as fuel is supplied, the fuel cells will continue to produce electricity--unlike batteries, they are re-usable and do not need to be discarded. A simple fuel cell can be made to demonstrate this principle. A graphite paste on a thin sheet of gauze is wrapped around a plastic hair roller. After it is air dried, roll up a thin sheet of zinc (obtained from an old battery casing) and insert it into the center of the roller. Place the fuel cell in a small dish of salt water which acts as the electrolyte. The salt water soaks up into the gauze covering the graphite. Attach a galvanometer to the fuel cell. An electrochemical reaction will cause the compass needle to move, proving electricity is produced chemically. The Shuttle's fuel cells are much more sophisticated than the simple cell described here, butthe concept grew from this simple basic experiment.

Board U
@ 4:00 PM

PLANT TISSUE CULTURE IN NON-LABORATORY CONDITION, Michele Collins, Route 1 Box 189B, Malta, Ohio 43758

Most work in tissue culture must be done under sterile conditions. This is the hardest part of attempting tissue culture without a lab. I thoroughly cleaned my work area, then rinsed the stainless steel surface with Clorox. I sterilized an aquarium with Clorix, then placed it on its side with the open side facing me. I pressure cooked my scalpel and forceps then placed them in 70% ethanol. Without a laminar flow hood, work must be done fast to avoid contamination. I chose a young leaf of a laboratory African violet. The leaf was put into a jar of antioxidant solution for 40 minutes, then into a 10% sodium hypochlorite solution for 5 minutes. I rinsed the leaf for 30 seconds in 70% ethanol. Using the forceps which were further sterilized by flaming over an alcohol burner, the leaf was placed into a petri dish and covered. Uncovering the dish for only a few seconds at a time, the sides of the leaf were cut off and the center was cut into squares using the flame sterilized scalpel. The explants from the center of the leaf were placed into previously prepared multiplication medium. The mouth of the jar was flamed before closing. The jar was then located to permit monitoring of photoperiod and temperature during growth of the culture.

Board V
@ 2:00 PM

THE EFFECTS OF A BONE MARROW TRANSPLANT ON A LEWIS RESISTANT RAT

Nancy L. Needs -
7375 St. Rt. 67, Rt. 4
Upper Sandusky, Ohio 43351

The history and success rates of isografts - grafts of tissue between genetically identical members of a species - of bone marrow in humans are discussed, including present methods of obtaining and preparing marrow. An experiment in which an isograft of bone marrow was performed on a Lewis Resistant rat was done. The hypothesis was that if the rat, after receiving 1000 rads of cesium radiation, lived through the procedure, the marrow cells injected into the rat would migrate to the bone marrow and begin to produce cells. The techniques used to obtain, prepare, and inject the marrow are explained, also. The rat was then monitored: food and water intake, as well as white blood cell levels and differentials, were observed. The rat lived 18 days after the isograft; the white blood cell count went from 300 to 4,900 in 12 days, and many immature forms of white blood cells were being seen in the differntials after 5 to 6 days. The conclusion reached was that the isograft had been viable, even though the rat died after 18 days. This was determined by removing a femur from the dead rat and preparing slides of the marrow. These slides were examined by a pathologist and myself. A sufficient number and variety of cells were present to provide an immune defense system for the rat.

Board W
@ 3:00 PM

THE SURFACE GEOLOGY OF RANDOLPH TOWNSHIP, PORTAGE COUNTY, OHIO

David H. Mangold
1197 State Route 44 Randolph, Ohio 44265

Randolph township can be located in the Kent and Canton, Ohio fifteen minute topographic sheets. Randolph township is in the glaciated region of the North American continent. As a result of the glaciation of the surface during the Pleistocene Epoch the preglacial surface was eroded. The preglacial surface was the Sharon Conglomerate. Glacial materials were deposited over this stratigraphic unit. The logement is ground moraines, kames, and kettles which are common on the present ground surface.

Within the township many large glacial erratics can be found. Striations and groves can be found on the erratics. The rock formations below the glacial till are determined from records of water wells, drill cuttings, wall charts and wall logs of gas wells, and oil and gas wells.

The current surface topography is a result of the preglacial topography and the modification of glaciation. The current surfaces is drained by a poorly connected deranged drainage system. The township has a continental divide or water shed passing through it. The divide separates the drainage to the Ohio River from that of Lake Erie. The continental divide has been placed on a local township map. Reworking of the glacial sediments occur largely in the streams.

Board X
@ 4:00 PM

COLOR: DOES IT AFFECT TASTE ?

Kristin Stefanek
2820 Southfield Dr.
Beavercreek, Oh.
45385

This investigation tested the effect of color on the perception of taste. A dilute lemonade mixture was colored to resemble three popular synthetic fruit drinks. Uncolored lemonade was used as a control. Eighty subjects (High School students, ranging in the ages of fourteen to sixteen) were tested. They were asked to taste a specified drink and identify the flavor. Eighty percent of the subjects identified the flavor of the experimental drinks as the one implied by the color. One hundred percent identified the lemonade control correctly. Thus, the results supported the hypothesis that color perception affects the perception of taste.

Board Y
@ 2:00 PM

COMPARISON OF ANALYSES OF COMPRESSOR LUBRICATION OIL TO DETERMINE LUBRICATING CONDITION. Ann Marie Corey, 1228 Superior St., Toledo, Ohio 43604

Lubricating oil is used in machinery (specifically the FCC compressor) to prevent wear on its rotating parts. The oil, when it begins to deteriorate, does not protect machinery adequately. Therefore, several tests have been developed to determine the condition of the used oil. Two tests were used extensively in this research: a Three Hour Copper Strip Corrosion Test and the Neutralization Number Test. The copper strip corrosion test indicates how corrosive the used oil is compared to ASTM standards on an incremental rating scale. The Neutralization Number Test shows the total Acid Number of the used oil. A third test, Suspended Solids was used on samples to determine the amount of sediment contained in them. The purpose of the experiment was to determine which test most accurately reflects the status of used oil. Results showed that the three hour copper strip corrosion test gives a lower rating of corrosiveness than the 19 hour test that is currently used but is more sensitive to variations. The Neutralization number test shows more sensitivity and is used at SOHIO.

Board Z
@ 3:00 PM

SLEEP-LEARNING...IS IT POSSIBLE?

Niraj Mehta 369 Bowling Green Place
Gahanna, Ohio 43230

I located four male subjects of the age of thirteen to experiment on. I questioned the subjects over ten facts before they slept. None of them knew any of the facts. I then played the answers five hours later and questioned them again in the morning over the same facts.

My findings were that patient A gained knowledge of three facts, patient B gained that of four, patient C gained that of three, and patient D also gained that of three.

Thus, my conclusion is that sleep-learning does, in fact, work to a certain extent.

Board AA @ 4:00 PM **NUCLEAR PHYSICS** **John Nielsen** **2809 Milltop Dr. Findlay, Ohio 45840**

Physics is a study of matter and how it works with energy and forces. Physicists now seem to be close to figuring out how matter forms with its fundamental particles and forces. My project involves a study of fundamental particles and forces, detection of particles, and an application for the future. To discuss the formation of matter, I will involve leptons, hadrons, virtual particles, the four forces, and the theory of Quantum chromodynamics. To detect particles, I have used photographic film and designed cloud chambers. The radioactive substance used was the luminous material found on some clocks. The film detected alpha particle tracks, and I calculated the approximate energy of the alpha particles using their tracks. Two cloud chambers were used to show the amount of radiation emitted from the substance One cloud chamber was the control (It only detected background radiation). The other contained the luminous substance. The comparison of track counts from both cloud chambers proved radiation was emitted from the substance in a reasonable amount. Finally, my project involves an application of Nuclear Physics, Nuclear Fusion. I will discuss how Nuclear Fusion takes place, and how the reactor receives energy from the reaction.

Board BB @ 2:00 PM COMPARISON OF SUCROSE, SACCHARIN, & ASPARTAME Janet Bruns, Box 303 Ottoville, OH 45876

Currently, the average American consumes more than one hundred pounds of sugar a year. This amount is more than one sixth of a person's total diet. Because sucrose, common table sugar,which cost 35¢ a pound,has 16 calories per teaspoon, and is considered an empty calorie, many people are looking for lower calorie sweetners. The two most popular are: aspartame which has 0.4 calories a teaspoon, is found naturally in foods, cost $90 a pound, and is 200 times sweeter than sucrose, and saccharin which has 0 calories a teaspoon, cost $4 a pound, and is 300 times as sweet as sucrose. Saccharins major drawbacks are: it is artificial, decomposes under heat, has a bad after-taste, and possible health hazzards, such as causing cancer and affecting the nervous system. However, aspartame and sucrose have their own health risks, which the general public is unaware of. Aspartame , for example, produces harmful methane in the body and affects the brain chemistry of people affected by diabetes, insomnia, and Parkison's disease. Sugar is thought to contribute to such ailments as kidney and liver malfunction, artery clogging, and impairment of growth. By comparing the sweetening power, cost, caloric content, health hazzards, taste, and ability to withstand various conditions, a person can see there is, as of yet, no clear winner when it comes to sweetners.

SECTION O. ENGINEERING
MORNING SESSION - ENGINEERING SCIENCE 2048
SATURDAY, APRIL 26, 1986
R. FRED ROLSTEN, PRESIDING

9:00 *EXTRACTIVE FERMENTATION: A NOVEL BIOREACTOR* R. L. Fournier, R. Kagolanu, M. T. Nguyen, Dept. of Chem. Engr., U of Toledo, Toledo, OH 43606

The rapidly growing field of biotechnology offers the potential for more efficient ways to produce a variety of valuable products. Potential areas of application include agriculture, chemicals, food, energy and the environment.

The design and operation of the bioreactor is critical to the success of the biosynthetic route. Bioreactors must be developed which are capable of operating at much larger scales and higher biosynthetic efficiencies. A novel bioreactor design which has the potential of meeting these objectives is extractive fermentation. In extractive fermentation a solvent is introduced to the fermentor which selectively removes the desired product as it is produced. Extractive fermentation offers several advantages in comparison to conventional approaches. These include potential increases in productivity due to decreases in product inhibition and simplification of the subsequent separation and purification steps. A mathematical model has been developed for an extractive fermentor. The model rigorously treats the material balance, reaction kinetics and liquid-liquid equilibrium relationships. The model is being used to evaluate the production of ethanol by extractive fermentation. Preliminary results show an increase in specific productivity and the ability to process a more concentrated feed. However, volumetric productivity is reduced in the presence of low capacity solvents.

9:15 EXPERIMENTS IN USING FUZZY CLASSIFICATION METHODS FOR ANALYSIS OF COMPUTER IMAGES TO DETECT A SPECIFIC CORONARY VESSEL OCCLUSION. K. J. Cios and W. P. Kuo, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606.

A system for classification of cardiad images has been developed. The system uses fuzzy classification approach for recognition of preprocessed images obtained from the Medical College of Ohio in Toledo. The original images were measured in the anterior, lateral and left anterior oblique projections.

In the system, which is based on the principle of learning with a teacher, several fuzzy clustering techniques have been applied to generate partitions of the whole data set of patients into subsets of patients with left anterior descending, right coronary and circumflex coronary artery occlusions. Classification was performed using combinations of features in measurement and transformed spaces. Linear orthogonal transformations were used to transform the original data. Different metrics were tried as a measure of similarity between the data vectors in both feature and measurement spaces. In addition some performance indexes were calculated to analyze classification validity.

9:30 DEVELOPMENT OF A MATHEMATICAL BLOOD-PERFUSION/TISSUE-TEMPERATURE MODEL FOR HYPERTHERMIA TREATMENT OF TUMOR TISSUE. Masoud Panjehpour and James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606, and Andrew J. Milligan, Department of Radiation Therapy, Medical College of Ohio, C.S. 10018, Toledo, OH 43699.

Recent research has suggested that a major cooling mechanism of tissue is blood flow. Experimental studies have shown that blood flow in tumor tissue is much less than in normal tissue, perhaps one to fifteen percent. The reduced cooling due to limited blood flow in tumors provides the basis for the differential heating of tumor and normal tissue desired in hyperthermia. Accurate knowledge of the relationship between blood perfusion and tissue temperature is a vital component in maximizing the therapeutic effectiveness for hyperthermia treatment.

This paper reports research directed toward developing an improved mathematical model of blood flow (perfusion) and blood-flow cooling. Starting from the bio-heat transfer equation (Pennes, 1948), subsequent research results are used to motivate a series of assumptions and approximations for the mathematical model. The resulting simplified model is a linear, constant-coefficient, first-order differential equation relating the tissue temperature T(t) and the blood perfusion rate w_b. The mathematical solution of this simplified model is being compared with experimental data for normal and tumor canine tissue during hyperthermia treatment.

9:45 EIGENIMAGE FILTERING OF NUCLEAR MEDICINE IMAGE SEQUENCES FOR DIAGNOSIS OF CANINE KIDNEY STENOSIS. Yantian Zhang and James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606, and W. J. Potvin and J. P. Windham, Department of Radiology, Medical College of Ohio, C.S. 10018, Toledo, OH 43699.

Temporal image sequences can be used to reveal functional information about an organ by recording the emission from radioactive tracer injected into the patient's body. Image processing techniques are often applied to such sequences to enhance the process of interest as an aid to diagnosis. This paper describes recent efforts to apply this eigenimage filtering technique to 90-second renal perfusion studies to enhance diagnosis of canine kidney stenosis.

The processing consists of three steps. First, the temporal images are used to obtain background-subtracted time activity curves for the aorta, left and right kidneys and bladder regions of interest. Second, these activity curves are fit by a mathematical model designed to distinguish between the vascular and cortex portions of the kidney activity. Third, using templates for normal canine vascular and cortex time activity curves as signature vectors for eigenimage filtering, either vascular or cortex activity can be enhanced and the other suppressed in the eigenimages. This project has focused on the third step of the process, as well as possible quantification of the results to indicate the presence of stenosis in left or right kidney.

10:00 STRUCTURAL DESIGN BY OPTIMIZATION TECHNIQUES. By Tanoh V. Eyorokon and Kuan-Chen Fu. The University of Toledo, Civil Engineering Department, Toledo, Ohio 43606.

This paper deals with the design of a number of structures in civil engineering using optimization techniques. These techniques are mathematical processes by which the best of all possible choices among the different design alternatives is obtained. The use of optimization entails the usage of a computer. For that, many algorithms have been developed. The Complex, the Gradient Projection, the Minimax, and the Variable Metric algorithms were used to successfully solve the following structural design problems: tubular and I-section columns, slender beams, determinate and indeterminate trusses, box plate structures, concrete beams and concrete plates.

10:15 A NEW APPROACH TO THE ANALYSIS OF SWIMMING MOTIONS. Ronald L. Huston and Hassan Khaledi, Department of Mechanical and Industrial Engineering, University of Cincinnati, Cincinnati, Ohio 45221-0072

Recent advances in multibody systems analysis are used to study swimming motions. The swimmer is modelled as a redundant multibody system - that is, a system with more degrees of freedom than are needed to accomplish a desired movement of say the hands or the feet

The governing dynamical equations are formulated with the desired hand or foot motion as constraint equations. Orthogonal complement arrays are then used to obtain a consistent set of equations. These are solved numerically for cases of special interest.

Application with the crawl stroke is discussed.

10:30 RIPPLES: A COMPILATION. R. Fred Rolsten, Ph.D., P.E., C.Mfg.E., Prof. of Engineering, Wright State Univ., Main P.O. Box 1604, Dayton, Ohio 45401, and Shige A. Moroi, Mechanical Engineering, Pennsylvania State Univ., 47 E. Prospect Ave., State College, PA 16801.

Rippled surfaces were produced by: impact of a 0.5-gm steel projection with a stack of metal plates; impact of Mylar with a stack of metal and plastic plates; impact of a serrated plastic projectile with a thick aluminum ignot; impact of a Nylon cylinder with a stack of inconel plates; plastic explosive shock front over a metal plate; impact of a rifle bullet on a painted metal plate. The purpose of this paper is to provide a comprehensive compilation of experimental data concerning the rippled surface on metal specimens.

10:45 HIGH PRESSURE RECIPROCATING PUMP PERFORMANCE TESTS. Naji Nassif, Jamal Hussein and Gerald Jakubowski, Department of Mechanical Engineering, The University of Toledo, Toledo, Ohio 43606 and Mark Lesniak, Giant Products, 3156 Bellevue Road, Toledo, Ohio 43606.

The net positive suction head (NPSH) at the pump inlet has always been used as the criterion for pump performance breakdown including such factors as excessive noise, vibration and the erosion of pump parts. The limiting value is called the net positive suction head required (NPSHR). Even with the vast literature already available, a theoretically derived or semi-empirical equation of sufficient accuracy for predicting the NPSHR has not yet been obtained. Therefore, the most acceptable means of determining NPSHR values is by performing laboratory tests.

Because of the above reasons, cavitation studies were made for several reciprocating axial triplex single acting high pressure plunger pumps. In the course of these studies, the NPSHR at the pump inlet was determined. A 3% decrease in the volumetric flow rate was defined as the critical cavitation level, and thus the determining factor for the NPSHR value. The NPSHR was determined for a wide range of pump sizes and multiple inlet configurations. The results were plotted versus RPM for each pump. Methodologies and pump trends will be discussed.

SECTION O. ENGINEERING
AFTERNOON SESSION - ENGINEERING SCIENCE 2048
SATURDAY, APRIL 26, 1986
R. FRED ROLSTEN, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 DESIGN OF ENZYME-pH ELECTRODES R. L. Stevens, S. Varanasi, Dept. of Chem. Engr., U of Toledo, 2801 W Bancroft, Toledo, OH 43606

There is currently considerable interest in the development of biochemical-specific electrodes that could be used to monitor and regulate the concentrations of biochemicals in body fluids. Very selective sensors can be made by a process in which the substrate of interest undergoes a chemical reaction, catalyzed by an immobilized enzyme, yielding products which can be sensed by an electrode specific to that species; often, the enzymic reaction leads to formation of ionic products which are monitored using "ion-specific" electrodes. Two frustrating problems often encountered with ion-selective electrodes are their susceptibility to interference by other ions and their tendency to exhibit non-Nernstian behavior. However, a plethora of enzymic reactions involves formation of consumption of acid products. This gives rise to the possibility of using conventional pH-electrodes, instead of ion-specific electrodes as sensing elements of enzyme-electrodes. pH-electrodes possess the advantages of cheapness, stability and ability to function with no interference from other ions. However, the fact that the enzyme's activity is sensitive to its pH makes the design of enzyme-pH electrodes more involved. A preliminary theoretical model is developed here which identifies important criteria for the successful design and operation of enzyme-pH electrodes. On this basis we were able to explain the response behavior of erzyme-pH electrodes developed by Nilsson etal Biochim Biophys. Acta 320 (1973).

2:15 IMPROVED SAMPLED-DATA PI FEEDBACK CONTROLLER USING INTELLIGENT (NONLINEAR) SUMMER. George Y. Ghreichi and James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606.

Feedback control is often used to provide desirable system response, as measured by zero steady-state error, short settling time, small overshoot and similar properties of both the transient and state-state response of the system for standard test inputs. Conventional proportional-plus-integral (PI) feedback controllers designed for desirable step response may not meet design specifications for the response to initial conditions and unknown disturbances.

The performance of modified PI feedback for sampled-data (discrete-time) controllers for linear time-invariant plants is investigated in this paper. The modification involves the incorporation of nonlinearity in the integral (sum) component of the feedback. This innovation represents an adaptation of a similar technique for analoq (continuous-time) controllers called "intelligent" integral control.

Design procedures and relations are presented and illustrated by an example application. Simulation results show the advantages of the "intelligent" summer in providing faster response with smaller overshoot and zero steady-state error for the system response to an initial condition and an unknown constant disturbance.

2:30 A NEW MODELING TECHNIQUE FOR THE GLASS RESISTANCE IN GLASS MELTERS. A. Ghandakly, Dept. of Electrical Engineering, University of Toledo, Toledo, Ohio 43606.

One of the design elements involved in sizing the electrical power equipment for glass furnaces is the determination of the glass resistances between operating electrodes. All methods to date used for this purpose are approximate and are based on a simple model considering the resistance between only two electrodes at the time. This paper presents a technique to develop a resistance model to any general configuration of electrodes and supply voltages in glass furnaces. The technique is based on relating the glass conductivity as represented by Ohm's law to its electrostatic property as represented by Gauss's law. The resistance model is then derived in a matrix form using the bus admittance frame of reference. A digital computer program has been developed to implement the proposed technique and example results are presented.

2:45 PLUGGING OF POROUS MEDIA - S.E. LeBlanc and J.B. McQuillen, Dept. of Chem.Eng.,University of Toledo, 2801 W.Bancroft, Toledo, OH 43606

The plugging of porous media by particulate matter has serious implications in many areas of engineering. For example, permeability losses in oil formations caused by particle plugging can result in severe declines in production rates. This phenomenon is also responsible for major reductions in throughput (or higher pressure drops) in deep bed filters. A survey of the relevant principles governing flow through and plugging of porous media will be presented. The importance of the particle/pore size ratio and the effects of polydispersity in the particle and pore size distributions will be emphasized. Even when the particles are smaller than the pores, damage due to plugging can still result through particle bridging at the pore mouths. Thus, particle concentration also plays an important role in the damage mechanism due to particle plugging. This so called "Holland Tunnel Effect" is a stochastic process which can result in severe permeability damage to porous formations even when the particle/pore size ratio is as small as 1/7. A constant pressure drop apparatus was constructed to study plugging behavior of a single capillary using polystyrene beads suspended in a sucrose solution. The results demonstrating the effect of particle/pore size ratio, particle concentration, and particle size distribution on plugging will be presented.

3:00 CONCENTRATION NOMOGRAMS FOR A MOMENTUM PLUME NEAR A COASTAL SITE. By D. Schroeder, S. T. Thomas, & A. Kumar. The University of Toledo, Civil Engineering Department, 2801 W. Bancroft, Toledo, Ohio 43606.

In this paper, nomograms to compute ground level concentrations near a coastal plant are developed for an elevated, momentum-type pollution source under lake breeze conditions. The nomograms use two-layer wind speeds, effective source height, lake-land temperature difference, and convective velocity scale as variables. Unit concentrations are plotted as a function of downwind distance for specific values of the variables within suitable ranges. The graphs are prepared using a coastal fumigation model, EMCON, developed at The University of Toledo. The model takes into account the development of a thermal internal boundary layer at a coastal site under lake breeze conditions. The model also accounts for meteorological conditions and source characteristics.

3:15 SENSITIVITY ANALYSIS OF A GAUSSIAN MODEL. By S. Kang, S. T. Thomas & A. Kumar. The University of Toledo, Civil Engineering Department, 2801 W. Bancroft, Toledo, Ohio 43606.

This paper examines the sensitivity of various inputs to ground level concentrations obtained using a Gaussian model widely employed in air pollution studies. A sensitivity index is developed to rank input variables according to the degree of sensitivity. The U.S. EPA guideline model, PTDIS, is the specific model used in this analysis. PTDIS calculates downwind concentrations of pollutants based on input of meteorological data such as wind speed, atmospheric stability, boundary layer height, and ambient temperatures as well as source data, such as emission rate and stack characteristics. Results indicate that errors in classifying atmospheric stability and wind speed have the largest effect on output. The sensitivity of the model also appears to be receptor dependent.

3:30 SOIL COLUMN TREATMENT OF SEPTIC TANK EFFLUENTS AND SEPTAGES FOR ORGANIC POLLUTANT REMOVAL. Yung-Tse Hung, and Jerry R. Taricska, Department of Civil Engineering, Cleveland State University, Cleveland, Ohio 44115

The objective of this laboratory research is to determine the effectiveness of downflow soil columns in the treatment of septic tank effluents and septages. The soil columns had media bed volumes ranging from 392 to 585 ml with hydraulic loading rates from 0.0302 to 1.122 gpd/ ft^2. The influent COD varied from 107 to 14,560 mg/l. After soil column treatment, the effluent contained COD of 60 to 1448 mg/l. Based on the cumulative COD value the COD removal efficiency was from 92.32 to 98 %. The soil columns used as tertiary treatment could effectively remove COD present in the septic tank effluents and septages.

3:45 OIL REFINERY WASTEWATER TREATMENT WITH BATCH ACTIVATED SLUDGE PROCESS. Yung-Tse Hung, and Maher A. Khourshid, Department of Civil Engineering, Cleveland State University, Cleveland, Ohio 44115

The objective of this laboratory research is to evaluate the feasibility of batch activated sludge process in the treatment of oil refinery wastewaters. Effect of wastewater dilutions and hydraulic detention times on the batch reactor performance regarding organic pollutant removals was examined. The oil refinery wastewaters were obtained from oil refinery in Toledo and Lima, Ohio, from the effluents from the API separators. Wastewaters were diluted in various concentrations ranging from 20 to 88 %. After batch activated sludge treatment, 32 to 81.6 % of influent COD was removed. The best COD removal efficiency was 81.6 % based on an influent COD of 221 mg/l. The COD removal efficiency increased with increasing hydraulic detention time in the batch reactors. The initial food to microorganisms (F/M) ratios had a significant effect on the COD removal efficiency. At higher F/M ratios the COD removal efficiency increased.

4:00 EXPERT SYSTEM BUILDING FOR DESIGN OF A SLURRY REACTOR MICROPILOT PLANT. Allyson Harshman, Chidambaram Subramanian, and Sunggyu Lee. Department of Chemical Engineering, The University of Akron, Akron, OH 44325.

Concepts of artificial intelligence are applied to the design of a slurry chemical reactor micropilot plant. Design specifications and heuristic rules from human experts are translated into the computer language, LISP. The expert system uses these rules to make decisions regarding the reactor design, saving time and effort for the process design engineers.

4:15 OPERATIONAL EXPERIENCE WITH A 40 KW ONSITE FUEL CELL ENERGY SYSTEM
Scott Arentsen
The Dayton Power and Light Company
P. O. Box 1247 Courthouse Plaza
Dayton, OH 45401

A 40 KW Onsite Fuel Cell Energy System was obtained and installed at a hotel in Dayton, Ohio in September 1984. Over the course of the 14 month field test period, 6227 operating hours were obtained with the unit. During the field test, the 40 KW Onsite Fuel Cell produced 189,000 KWH and 148 million BTU of usable heat. Although certain operational problems were experienced, results indicate that fuel cell technology is capable of providing both electricity and heat energy according to specifications. Environmental and electrical output quality characteristics were verified. Maintenance tasks were performed and documented so that design changes may be incorporated in future commercial power plants.

4:30 SIMULATION AND CONTROL OF A PAPER AIRCRAFT. Babette Husson and Tom T. Hartley, Department of Electrical Engineering, The University of Akron, Akron, OH 44325

The equations of motion for a paper aircraft are derived and explained. It is shown that the longitudinal motion equations must include the angular acceleration of the angle and attack due to moments acting about the center of mass. This contribution is often ignored on large aircraft models. Various computer studies of paper aircraft trajectories are presented. From the models, strategies are given for controlling the aircraft. Paper aircraft provide unique problems as their control surfaces are fixed and cannot be modified in flight as on large aircraft. Extensive consideration is given to the relative positions of the center of mass, center of lift, and center of drag. It is shown that for stability, the center of lift should usually be above and behind the center of mass. Other controlling parameters are shown to be applied moment (elevator angle), wing shape (flaps and slats), and the initial velocity, pitch, and angle of attack. Optimal control studies are also undertaken using the derived computer models. Suggestions are made on how to construct or modify a paper aircraft to provide a desired type of performance.

SECTION Q. ECONOMICS
ECONOMICS OF BIOTECHNOLOGY SYMPOSIUM
CONTINUING EDUCATION 9 & 10
FRIDAY, APRIL 25, 1986
WILFRED R. KONNEKER, PRESIDING

9:00 WELCOME - WILFRED R. KONNEKER
OHIO UNIVERSITY INNOVATION CENTER

9:05 BIOTECHNOLOGY AND PLANT PRODUCTIVITY. C.A. Cullis, Department of Biology, Case Western Reserve University, Cleveland, Ohio 44106.

One of the major limiting factors in the application of biotechnology to plant science is the lack of basic information concerning the developmental processes in plants and the genes involved in these processes. A major factor in the yields of corn is the heterotic effect found in hybrid plants when compared with their parents. However we understand neither the basis for heterosis nor how to identify which combinations of parents will yield an heterotic hybrid. This still has to be determined on the basis of trials involving many plants. A screen to identify such sources of combining ability at the laboratory level would allow an earlier selection of potentially useful material. The determination of the molecular basis of heterosis would also help to identify the reasons such heterotic effects are not observed in many other crop species. The use of plant tissue culture to generate agronomically important traits is unproven in many species but the ability to control the amount of variation would be important. One character which may prove useful in developing predictive screens for heterosis and culture induced variation is the stability of the plant genome and this is presently being investigated.

9:40 STAGES IN THE INNOVATION PROCESS FOR ANIMAL BIOTECHNOLOGIES. Richard W. Janson, Lala B. Krishna, and Dale S. Borowiak. Department of Mathematical Sciences, The University of Akron, Akron, Ohio 44325.

The introduction of recombinant gene technologies into the production of meat animals is equivalent to successive substitution of a new production function. A two-stage process is outlined -- spatial diffusion of the embryological facilities, which is a function of organization and entrepreneurship, and adoption by breeders, which is a function of time and can be modeled as a stochastic process.

Markovian techniques are used to project expected levels of production (scenarios) over time. Some of the realities of spatial diffusion are also discussed, because supply constraints in the transplantion of the embryo will limit the rate of technology diffusion and adoption of genetic methods of growth enhancement by breeders.

10:15 BIOTECHNOLOGY AND AGRICULTURAL ECONOMIC DEVELOPMENT. Thomas E. Wagner, Ph.D. 332 Irvine Hall, Ohio University, Athens, Ohio 45701

New advances in biotechnology allowing the transfer of specific cloned genes into the genetic composition of both agricultural plants and animals open new vistas for agriculture. Technologies derived from these basic advances offer the opportunity for agricultural producers to produce new and existing food products with higher profit margins and to produce a wide range of new non-food agricultural products. Application of these technologies offers the promise of new partnerships between the agricultural producer and the commercial sector including the chemical, pharmaceutical and food processing industries to the benefit of all.

11:20 CURRENT DIRECTIONS OF LEGAL RULINGS IN BIOTECHNOLOGIES. Charles S. Howland and Hollis L. Howland. Office of the Morrow County Prosecutor. Mount Gilead, Ohio 43338.

Many biotechnologies based on genetic engineering are leaving the research and development arena and entering into commercial production. The legal ramifications mirror the technologies. The attitude of courts to litigation involving patent filings for sexually transmissable genetic traits are reviewed and the likely direction of future rulings are discussed. The distinction in applications between medical uses, such as interferon innoculation, and animal growth uses, such as genetically improved meat production are reflected in corresponding court rulings. The present body of law is more extensive than generally realized and therefore the direction to the thrust of the law can be evaluated.

12 NOON - LUNCHEON
DRISCOLL CENTER FOR CONTINUING EDUCATION
FRIDAY, APRIL 25, 1986
1:00 PM - SPEAKER
HERMAN J. EICHEL, PRESIDENT
AMERICAN INSTITUTE OF CHEMISTS
"BIOTECHNOLOGY AND THE PHARMACEUTICAL INDUSTRY"

SECTION Q. ECONOMICS
ECONOMICS OF BIOTECHNOLOGY SYMPOSIUM
CONTINUING EDUCATION 9 & 10
FRIDAY, APRIL 25, 1986 AFTERNOON - 1:35 PM
WILFRED R. KONNEKER, PRESIDING

1:35 CHANGING MARKET EVALUATIONS OF BIOTECHNOLOGY FIRMS. Richard W. Janson and Vera K. Pavlakovic. The Janson Industries, 1200 Garfield SW, Canton, Ohio 44706.

The market value of selected public firms within the biotechnology industry have been computed in a time series to evaluate the performance of the specific companies within their industries and the performance of the biotechnology industries within a larger universe of publicly traded companies. The objective of the study is to analyze the individual firm performance into components that are driven by (1) the overall performance of the economy; (2) industry performance vis a vis other industries; and (3) specific performance of the individual companies vis a vis other firms with the industry. The method of analysis is independent of conventional profit and loss approaches. The market alone is used for the evaluations. The changes in market value are attributed to the three driving categories and are corrected for the size of the firm. The standard and Poor Compustat data base has been used for the research.

2:10 SOME IMPLICATIONS OF THE DEVELOPMENT OF A HIGH BIOTECHNOLOGY: THE PERSPECTIVE OF ECONOMIC HISTORY
Martin Gerhard Giesbrecht
Wilmington College
Wilmington, Ohio 45177

Each major technological development, emphatically including the new biotechnology, alters the economics of property rights, capital formation, and indebtedness. The economic foundations of social status, political power, and leadership are also altered. Because it functions primarily in the informational, rather than in the material realm, the new biotechnology introduces dramatic alterations in these economic areas and introduces new dimensions in the areas of theft, sabotage, terrorism, and, most important of all, in the nature of the profit motive that generates the dynamism for economic activity.

2:30 ROUND TABLE DISCUSSION

PARTICIPANTS:

G.S. BAMBECK
DALE S. BOROWIAK
IRENE M. COTTON
C.A. CULLIS
R.M. GESINSKI
MARTIN GEHARD GIESBRECHT
CHARLES S. HOWLAND
HOLLIS L. HOWLAND
RICHARD A. HUDSON
RICHARD W. JANSON
LALA B. KRISHNA
WILFRED R. KONNEKER
VERA K. PAVLAKOVIC
THOMAS E. WAGNER
SHANG-TIAN YANG

SECTION R. ECOLOGY
FIRST MORNING SESSION - BOWMAN ODDY 1045
SATURDAY, APRIL 26, 1986
MICHAEL C. MILLER, PRESIDING

9:00 PRELIMINARY STUDY OF THE WATER QUALITY OF FIELD'S BROOK, ASHTABULA COUNTY, OHIO. Roger L. Lane. Kent State University, Ashtabula Campus, Ashtabula, OH 44004.

Water samples were obtained from five locations along Field's Brook, including sites upstream and downstream from the industrial area through which this stream flows. The primary sampling period was September, 1977, to May, 1978. Additional samples were taken in the autumn of 1985.

The levels of ammonia, chloride, chlorine, dissolved solids, iron, nitrate, nitrite, phosphate, and sulfate were determined for each sample. Iron and phosphate were higher in concentration in water taken upsteam from the industrial area. The levels of chloride, chlorine, dissolved solids, and sulfate were significantly elevated in water taken downstream from the industrial area.

9:15 SEASONAL HERBICIDE OCCURRENCES IN RAINFALL. David B. Baker, Water Quality Laboratory, Heidelberg College, Tiffin, Ohio 44883.

From April through August 1985, rainfall samples were collected at four sites, including West Lafayette, Indiana; Tiffin, Ohio; Parsons, West Virginia and Potsdam, New York. Analyses of the rainwater indicated that, during May and June, several herbicides are present. Peak concentrations were observed in samples from Tiffin, Ohio. These included atrazine, 1.3 µg/L; alachlor, 4.5 µg/L; and metolachlor, 2.4 µg/L. These concentrations are high in comparison with reported concentrations of DDT and other persistent chlorinated pesticides in rainwater. The timing of rainfall contamination by these herbicides concides with the timing of their application. The significance of seasonal herbicide contamination in rainfall needs to be assessed for both terrestrial and aquatic ecosystems.

9:30 BASELINE DATA ON DISTURBANCE-SENSITIVE LAKES IN CENTRAL IDAHO. Robert D. Ries and Paulo De Olivera. Dept. of Biological Sciences, University of Cincinnati, Cincinnati, Ohio 45221.

Diatoms were sampled from rock scrapings and the epibenthos of 15 high-mountain lakes in Central Idaho. This region is included in the Idaho Batholith, which is characterized by thin, poorly developed granitic soils, resulting in watersheds containing oligotrophic lakes and streams that are very sensitive to acidification and other human disturbances.

Water samples were collected and analysed for pH, alkalinity, sulfate and major cations, and a general description of the watershed was recorded for each lake. Alkalinity values determined by acid titration to a fixed endpoint of pH 5.1 or 4.8, ranged from 0.04 meq./L, and pH values ranged from 5.6 to 6.6, indicating that the lakes fall in the category of extremely soft to slightly soft waters.

Correlations between diatom species-assemblages, and watershed morphometry and water chemistry were then used to determine diatom species that may be useful biological indicators of waters threatened by human disturbance.

9:45 HYDROLOGY OF A DRAINAGE BASIN IN THE ARCTIC FOOTHILLS, ALASKA. K. R. Everett, Institute of Polar Studies and Department of Agronomy, The Ohio State University, Columbus, Ohio 43210.

Hydrology of far northern drainage basins in which the shallow organic-rich surface layer overlies a permanently frozen substrate, is poorly known, yet is of great importance in evaluating natural stability and in predicting response to disturbances effecting flow and the distribution of nutrient and sedimentary ions. First-year study of a 2.3 km^2 watershed supports the primacy of the short duration melt-off in the yearly hydrologic/geochemical cycle. At this time basin storage capacity is minimum and total runoff carries with it a seasonal maximum of nutrient ions, suspended and dissolved solids. Subsequent to melt-off base flow is high but decreases as thaw releases seasonally frozen water, including some temporarily stored melt-off. Spring storm events produce rapid peak discharges because of the low storage capacity in the catchment. Rare, high intensity, short duration storms in early season can produce discharges that rival diurnal peaks at melt-off. With activation of vegetation following melt-off, some nutrient ions are no longer detectable and pH becomes acid. Summer drought periods are common and if sufficiently protracted, reduce stream flow to barely measurable quantities. At such times hydrographs may show small diurnal fluctuations in response to evapotranspiration cycles. Ion concentrations show an increase as senescence commences in mid-August.

10:00 PRIMARY PRODUCTION IN TROPICAL LAKES OF ECUADOR. Michael C. Miller and Miriam Steinitz-Kannan Department of Biological Sciences, Univer. of Cincinnati, Ohio 45221 and Biology Dept. North. Kentucky Univer., Highland Heights, Ky.

On four expeditions to Ecuador between 1981 and 1984, some 30 lakes and ponds were sampled for morphometry, chemistry, and algal composition while measuring their 14C-production. Moist-climate, cool mountain lakes from the paramo(12,000 ft and wet, hot, low-elevation rainforest lakes(1000 ft) had reasonably low production rates. Mid-elevation lakes in relatively dry climates, where evaporation exceeded rainfall, nutrients were concentrated allowing very high rates of algal production. Recent volcanic calderas and dammed lakes were exceptional, fertilized from volcanic springs. Quilatoa, fed by sulfurous waters 1/3 as saline as seawater, had a production rate of 22 g C/m^2-day. A polymictic lake called Yambo, had the highest chlorophyll biomass yet described in the western hemisphere(1200 mg/m^2) in its 28m mixed layer. Limitation of primary production at high and low elevation lakes was caused by light limitation caused by cloudiness. The intermediate, Inter-Andean lakes were more likely limited by the depth of the mixed zone relative to the depth of the trophic zone.

10:15 DIATOM ASSEMBLAGES AND THEIR USE IN THE RECONSTRUCTION OF THE HOLOCENE CLIMATE IN EQUATORIAL SOUTH AMERICA. Paulo E. De Oliveira and Michael C. Miller. Dept. of Biol. Sc., Univ. of Cincinnati. Cincinnati,Ohio

Paleoclimatic records from South America are rare in the literature and climatic reconstructions of its equatorial area are even more scarce. We have initiated a study of contemporary diatom floras of lakes located in two different climatic zones in the equatorial region of South America: high altitude Andean and Amazon basin lakes.Fossil diatom assemblages have also been examined in sediment cores from two lakes, Lake Cunro and Lake Kumpak, which are located in those two areas respectively. Present-day diatom flora is strikingly different in both lakes due to differences in climate, basin morphometry and land occupancy. Lake Kumpak is dominated by Cyclotella pseudostelligera and other centric diatoms and Lake Cunro is dominated by Melosira granulata var. angustissima and some Pennate diatoms. Preliminary investigations of Lake Kumpak's sediments have shown no climatic changes in the region during the last 2000 years. This same pattern has been observed in Lake Cunro and other South American lakes. Holocene climatic reconstruction based on these two sediment cores and present-day diatom floras will be discussed.

10:30 EFFECTS OF NUTRIENT ENRICHMENT ON PHYTOPLANKTON COMMUNITIES IN AN OLIGOTROPHIC ARCTIC LAKE. AN INTERPRETATION OF DCMU INDUCED FLUORESCENCE. Bernard J. Moller and Michael C. Miller. Dept. of Biol. Sci. Univ. of Cincinnati, Cincinnati, Ohio 45221.

The flow of electrons from Photosystem II to Photosystem I may be influenced by light or nutrient availability. DCMU (3(3,4-dichlorophenyl)-1,1-dimethyl urea) blocks this electron flow. The resultant change in chlorophyll fluorescence

might be used to evaluate nutrient and/or light conditions.

The response of phytoplankton communities to enrichment was examined in limnocorrals set in an oligotrophic arctic lake, Toolik Lake, Alaska. Six corrals (5 m diameter) were treated with Nitrogen and Phosphorus, added at 0, 2 and 10 times the normal nutrient loading for the lake.

In the lake, without enrichment, the algal fluorescence decreased seasonally as the algae became N and P limited. In the corrals, the DCMU induced fluorescence was proportional to nutrient treatment over most of the 36 day experimantal season. The cellular fluorescence capacity (CFC) of the algae in darkened carboys, containing water from the corrals, remained constant over the 4 day duration of the experiment; however, nutrient exhaustion caused a decrease in CFC, which was most severe in the control corrals which had no nutrients added.

10:45 GREEN LEAF DECOMPOSITION IN TWO SOUTHEASTERN STREAMS. Jennifer Jaroscak and Dr. J. Vaun McArthur. 1019 N. Fountain Ave, Springfield, OH 45504

Green Acer Rubrum leaves in mesh bags were placed in an ambient stream and a post-thermal stream. The rates of decomposition were 0.0464 and 0.0395 respectively. These values are approximately twice the rate of previously published data for autumn Acer Rubrum leaves. Macroinvertebrates were collected and keyed, and the effect of predators was measured. These factors influenced the decomposition rate. Our data suggests that green leaf decomposition is faster than autumn leaf decomposition. Possible reasons for the difference include temperature and better food quality of green leaves.

SECTION R. ECOLOGY
SECOND MORNING SESSION - BOWMAN ODDY 1049
SATURDAY, APRIL 26, 1986
R. BOERNER, PRESIDING

9:00 RELATIONSHIPS BETWEEN THE SEDIMENT SEED BANK AND EARLY SERAL VEGETATION OF A NEWLY CREATED MARSH IN SANDUSKY BAY. Carol E. Siegley, J.M. Reutter, Ronald L. Stuckey and R.E.J. Boerner. Graduate Program in Environmental Biology, Center for Lake Erie Area Research, and Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Construction of Big Island Wetlands was initiated in autumn 1983 as a result of mitigation requirements of the development of The Harbour condominiums at the mouth of Pipe Creek, Sandusky, Ohio. Approximately 50 ha were diked into four connecting cells for the dual purposes of dredging sediment disposal and the creation of a wetland area to replace that lost to construction. During late summer 1985, the early seral vegetation of the four marsh cells was mapped using a combination of aerial photography and ground sampling. To determine the importance of the sediment seed bank in the development of this early seral vegetation, 40 sediment samples were taken from each of the cells during Spring 1985. The samples were split into subsamples for greenhouse germination trials. Half of the subsamples were given mudflat conditions and the other half submersed to simulate conditions in the flooded portion of the marsh cells. All seedlings were harvested after two months and identified. The samples were then given a cold treatment to break dormancy of any remaining viable seeds and the greenhouse treatments repeated. The species composition and relative abundance patterns of the seed bank of each cell were compared to the early seral vegetation by rank correlation.

9:15 THE EFFECTS OF LEAF LITTER REDISTRIBUTION ON SOIL NUTRIENT AVAILABILITY IN HARDWOOD FOREST WATERSHEDS. Kooser, James G. and R.E.J. Boerner Environmental Biology Program and Department of Botany, The Ohio State University, 1735 Neil ave., Columbus, Ohio 43210

Many forest watersheds in the eastern U.S. are composed of a series of patches of different tree species assemblages on soils of different nutrient availability. The post-litterfall redistribution of hardwood litter may be a factor in maintaining the gradients of soil nutrient availability among these forest patches. To evaluate the importance of this litter redistribution, a 2 yr. study was undertaken in Neotoma valley, a 72 ha. watershed in south-central Ohio. Net litter input (vertical litterfall + redistribution) was greater on the drier SW-facing slope than on the more moist NE-facingslope, and ridgetops had smaller net inputs than terraces and lower valley sites. Rates of litter movement varied with season and with litter type; most redistribution occurred in the spring, though seasonal variation was greater on the NE-facing slope. Oak litter was redistributed to a greater degree than was non-oak litter, especially on the drier SW-facing slope. Forest sites with the greates net litter inputs also had higher soil fertility, at least in terms of extractable N and P levels.

9:30 EFFECTS OF SLUDGE APPLICATION ON POPULATIONS OF DAUCUS CAROTA AND ASCLEPIAS SYRIACA Erik Creagh, Shari Koslowsky-Runge and Johnna Sholtis. Department of Botany, The Ohio State University, Columbus, Ohio 43210

At an abandoned field near Groveport, Ohio, a comparison of populations of a biennial, Daucus carota, and a perennial, Asclepias syriaca, was undertaken for examination of differences attributable to a singular application of anaerobically digested sewage sludge in 1982. Morphometric, reproductive and density parameters are given special consideration. Sludge application had a significant effect on the density of juvenile Daucus carota in plots where adults were present. A smaller percentage of sludge treated plots had no juveniles in the presence of adults. This, and significant differences in mean umbel number and stem diameter at the primary umbel base, point to higher seed output and seedling establishment in the sludge treated site. Although sludge application had no significant effect on the density of Asclepias syriaca, plant height, basal stem diameter and the number of pods produced per plant were significantly greater on the site treated with sludge. This indicates that increased nutrient levels not only increased vegetative growth, but also increased reproductive output by increasing pod production and consequently seed production.

9:45 DISTRIBUTION AND SEEDLING ECOLOGY OF PURPLE LOOSESTRIFE IN OHIO'S LAKE ERIE MARSHES Gregory R. Balogh, Ohio Coop. Wildl. Res. Unit, The Ohio State Univ., 1735 Neil Ave., Columbus, OH 43210

Purple loosestrife (Lythrum salicaria) is an introduced wetland perennial plant that has spread westerly to marshes in the midwestern U.S., has crowded out valuable native wetland plants, and has little value to wildlife. This study was conducted to document the extent of Lythrum infestation in Ohio's Lake Erie marshes, and to study aspects of Lythrum seedling ecology which may aid in its control. Color transparencies taken from fixed-wing aircraft in August 1984 were inspected for indication of Lythrum occurrence. Slides covered Ohio's Erie, Lucas, Ottawa, and Sandusky counties, where most of Ohio's Lythrum grows. Digitization of projected images revealed 1210 ha of Lythrum infested wetland, and 77 ha of Lythrum infested upland. Loosestrife seedlings were inundated to several depths until seedling mortality was apparent. Nearly 100% mortality was obtained by the 8th week of flooding at all depths. Competition planting experiments conducted on mudflats in Ottawa County showed that nodding smartweed (Polygonum lapathifolium) could out-compete Lythrum for resources in the first year of growth when both species were planted at naturally occurring seed densities (707 and 149 kg/ha, respectively). Nutsedge (Cyperus feruginescens) and Walters millet (Echinochloa walteri) were not effective competitors.

10:00 SEED WEIGHT OF AMARANTHUS RETROFLEXUS L. IN RELATION TO LENGTH OF GROWING SEASON AND MOISTURE AVAILABILITY. Andrew J. King and Alison A. Smith, Department of Zoology and Graduate Program in Environmental Biology, The Ohio State University, 1735 Neil Ave., Columbus, OH 43210

Seed weight variability can have important consequences for the growth and establishment of annual plants. In particular, there has been a great deal of interest in clinal variation and the selective advantage of large seeds under certain environmental conditions. Analyses of seed weight variation in Amaranthus retroflexus L. (redroot pigweed) have suggested clinal trends, however results have been confounded by a high correlation between low moisture availability and short growing season. One analysis of bulk seed suggested that plants growing in drier areas produce heavier seeds as do plants experiencing a shorter growing season. In our study, seeds were collected from individual plants growing in areas that differed in moisture content. Sections of each area had been disturbed at different times so the lengths of growing seasons were known. ANOVA of bulk seed samples indicates that plants experiencing the shorter growing

season produced significantly heavier seeds, but that plants in the drier areas produced lighter seeds. However, when mean seed weight per plant is considered, the trends are still evident but significance is decreased.

10:15 NATURAL SELECTION, CONSORTIA AND ECOSYSTEMS. B. R. Stinner[1], D. H. Stinner[2] and S. C. Rabatin[3]. Department of Entomology[1,2] and Department of Plant Pathology, Ohio State University, Wooster, OH 44691.

Ecological studies can be divided into two groups:one which centers on evolutionary phenomena and another which considers organisms and the abiotic environment as systems processing energy and materials. The evolutionary ecology and ecosystem school of thought seem to present a paradox. The former accentuates antagonistic relationships as an organizing force in nature whereas the latter perceives mostly facilitation within systems. The goal of this paper is to suggest a bridge between evolutionary and ecosystem paradigms. We begin by suggesting that synergistic associations may be particularly important in structuring communities and influencing ecosystem processes. We develop the idea of the keystone mutualism and introduce the consortium concept. We apply this term to closely associated species groups, and argue that examination of consortia structure and function provides a framework in which evolutionary and systems-level parameters can be related. Within this framework a model is presented in which organisms increase fitness by interacting in ways that predictably augment ecosystems processes. Thus individual benefit is best served through indirect mutual facilitation.

10:30 GENETIC VARIABILITY AND GEOGRAPHIC VARIATION IN CARABID CAVE BEETLES. David Fisher, Dept. of Biological Sciences, University of Cincinnati, Cincinnati OH 45221

Genetic variability and geographic variation were studied in two subspecies of the carabid beetle, Ameroduvalius jeanneli, from data on eleven enzymatic loci obtained by polyacrylimide gel electrophoresis. Genetic variability levels in A. jeanneli were compared with those found in three other genera of cave carabids; Darlingtonea, Neaphaenops, and Pseudanophthalamus. The results suggest that selection may play a role in determining the levels of genetic differentiation between taxa. Genetic differentiation appears to be maintained by geagraphic barriers to gene flow. The principal geographic barriers are noncarnous, clastic strata and large rivers. The cave dwelling Ameroduvalius and Darlingtonea are found in overlapping ranges in Southeastern Kentucky. The ranges of these genera are interrupted by a three-sided "River Triangle" composed of the Cumberland and South Fork Rivers. The electrophoretic data were analyzed using statistical methods (e.g. Nei's Index, Rogers Coefficient of genetic similarity, and F-statistics) to assess the effect of these rivers as geographic barriers. Finally, the data were compared with data accumulated on Neaphaenops and Pseudanophthalamus, a pair of coexisting carabid beetles that maintain a level of genetic differentiation between taxa due to geographic barriers to gene flow in a seperate karst region

SECTION R. ECOLOGY
THIRD MORNING SESSION - BOWMAN ODDY 1053
SATURDAY, APRIL 26, 1986
GEORGE UETZ, PRESIDING

9:00 EXPERIMENTAL EVALUATION OF POPULATION INTERACTIONS IN TWO SPECIES OF DESMOGNATHINE SALAMANDERS. Roger E. Roudebush and Douglas H. Taylor, Department of Zoology, Miami University, Oxford, OH, 45056.

The nature of population interactions in two species of desmognathine salamanders, Desmognathus quadramaculatus and D. monticola, was examined in a controlled laboratory situation. An artificial stream tank (6.3m x 1.1m) was divided into four equal sized quadrants. Each quadrant contained six different substrate types ranging from sand to large rock. One half the tank width contained a stream of water; the other half contained the substrate types built up upon a pea gravel streambank. Each salamander species was divided into two groups according to body size. Data were obtained by recording salamander substrate preference at the end of a 72 hour period. Controls for each size class were collected by randomly introducing six conspecifics into a stream quadrant. All four groups of salamanders preferred large rock substrate under these conditions. With the number of salamanders remaining constant, experimental runs involved the introduction of different sized conspecifics or congeners to control quadrants. The results showed that intraspecific displacement occurred in D. monticola but not in D. quadramaculatus. Interspecific displacement was detected in D. monticola but not in D. quadramaculatus. These data indicate that the substrate selection of all sizes of D. monticola was altered significantly in the presence of any sized D. quadramaculatus.

9:15 AGONISTIC BEHAVIOR AND SPACING IN SOLITARY AND COMMUNAL METEPEIRA SPP. (ARANEAE: ARANEIDAE). Maggie Hodge, Dept. of Biological Sciences, M.L.#6, University of Cincinnati Cincinnati, OH 45221

Metepeira spinipes Pickard-Cambridge is a communal, yet territorial orb weaving spider. These spiders show an intermediate level of sociality, in that they live communally, but individuals build their own orb and do not share prey. Populations of this species from desert and tropical regions of Mexico show varying degrees of social behavior. This research examined the relationship between agonistic behavior and spacing in populations of these spiders raised under identical conditions of space and food availability in the laboratory. These studies found that individuals from the desert population show a greater tendency to behave agonistically towards conspecifics, whereas the tropical spiders show a high level of tolerance. Interaction strategies used in disputes over web sites were found to differ in tendencies to escalate to conflict and to abandon a fight. The desert spiders were more similar in their behavior patterns to two other species of Metepeira which are normally solitary but have been reported to build in groups. These two species were also raised under controlled conditions in the laboratory.

9:30 GENETIC DIVERGENCE OF ALLOPATRIC CAVE CARABIDS. William J. Badaracca Dept. Biological Sciences, University of Cincinnati, Cincinnati, OH 45221

The entrenchment of the Ohio River effectively isolated northern populations of an obligate cave carabid beetle from the southern populations resulting in divergence and the formation of two geminate species, *Pseudanopthalmus tenuis* in Indiana and *P. barberi* in Kentucky. In addition the northernmost populations in Indiana show a more recent divergence from *P. tenuis* to form a sibling species, *P. stricticollis*. Electrophoretic data for ten enzymatic loci have been examined from four populations of *P. barberi*, six populations of *P. tenuis*, and three populations of *P. stricticollis*. Similarity (S) between species on either side of the river is 0.67, indicating that the Ohio River has been an effective barrier to gene flow. Similarities among conspecific populations and between *P. tenuis* and *P. stricticollis* are greater than 0.90, indicating that conspecific populations on either side of the Ohio River have not diverged. Further the recent origin of *P. stricticollis* from *P. tenuis* is consistent with their electrophoretic similarity. Thus, the findings of on *P. barberi*, *P. tenuis* and *P. stricticollis* are consistent with their present day distributions and presumed evolutionary histories. Further, the presence of the same rare alleles in all species is consistent with the hypothesis of a widespread ancestral form.

9:45 WEB DIFFERENCES IN POPULATIONS OF COMMUNAL SPIDERS: EVIDENCE FOR SOCIAL EVOLUTION. George W. Uetz, Dept. of Biological Sciences University of Cincinnati, Cincinnati, OH 45221-0001

Web construction and spatial organization of Metepeira spinipes Pickard-Cambridge, a communal orb weaver from Mexico, were studied in the lab and in the field. The spatial organization of web colonies varies within populations as a function of food supply and colony density, and between populations as a consequence of genetic differences in tolerance of conspecifics. Inherent differences in the pattern of construction of the colony web were seen between populations from moist tropical forest and desert habitats. When relocated in the field or introduced to lab cages, individuals from the desert population attach webs together. However, construction of the colony web is the result of simultaneous independent efforts rather than cooperation. Tropical forest spiders, in contrast, all participate in building a communal framework. Individuals then build their own web within this framework. These findings suggest that cooperative behavior has evolved in the tropical forest population. Web construction behavior of this type can only exist in a social context, and is rare in spiders.

10:00 A SCHEME FOR ELIMINATING PERIODICAL CICADAS FROM ORCHARDS WITHOUT USING INSECTICIDES. Monte Lloyd & JoAnn White, Dept. of Biology, Univ. of Chicago, 915 E. 57th St., Chicago IL 60637.

Cicada nymphs feed only on root xylem fluid, which is exceedingly dilute (hence the cicada's long life cycle). The smallest nymphs have mouthparts too short to reach xylem vessels in any but the smallest roots, yet trees routinely slough their smallest roots in winter and grow new ones in spring. Grass roots are not sloughed; young cicada nymphs readily feed on grass roots when available. Hence, the grass grown in orchards is a key factor in creating a habitat more favorable for cicadas than is natural forest. Periodical cicada eggs are laid in twigs during June and hatch in late July and August. Nymphs drop to the ground and immediately enter soil crevices in search of a rootlet. By October, they will be established and feeding mainly on grass roots, but only on the grass directly under tree canopies. If this grass is killed with herbicide, the majority of nymphs should perish, since they will not have enough energy reserves to burrow through the soil in search of a live rootlet. Cicada nymphs grow very slowly and continue to feed on grass roots for years. Hence, when new grass is seeded under orchard trees, it can serve as a decoy for nymphs abandoning sloughed tree rootlets. When this grass is temporarily eliminated a second time, the 17-year cicada problem should be solved for the next 15 years.

10:15 EVOLUTIONARY PATTERNS IN CARABID BETTLES
Dana C. Ebbets
Dept. Biological Sciences, University of Cincinnati, Cincinnati OH 45221

Many species of trechine bettles in eastern North America are presumed to be descendants of edaphic ancestors, which were widespread during cooler, wetter climates associated with glacial maximas. With the onset of warmer, drier interglacial periods continuous populations were fragmented onto mountaintops, sinkholes, coldsprings and caves which mimicked the glacial climate.

Trechus cumberlandus although not ancestral to and taxonomically remote from cave trechines seems to be following a parallel evolutionary history. The species is found argely in sinkholes, cave enterances, and occasionally in caves themselves. Trechus cumberlandus has a closer taxonomic and morphological affinity with species of T. hydropicu and T. schwarzi, isolated on mountaintops. Thus it appears that T. cunberlandus is a threshold cave species exhibiting the characteristics of initial cave isolation.

Genetic patterns in populations of T. cumberlandus were compared with those of montane species of Trechus, and with cave obligate species of trechines using gel electrophoresis The data have been analyzed for differences in heterozygosit between species, and for comparison of geographic differentiation using Rogers Coefficient of similarity (S).

10:30 THE APPARENT ABSENCE OF ALLOZYME SELECTION BY HEAVY METALS IN A POPULATION OF THE EARTHWORM LUMBRICUS RUBELLUS. Michael T. Dixon and Sheldon I. Guttman, Department of Zoology, Miami University Oxford, Ohio 45056.

Individuals of Lumbricus rubellus were collected from six 0.1-ha plots of a seventh-year old-field community at the Miami University Ecology Research Center. Two of the plots have been systematically treated with heavy metal bearing sewage sludge, two with an urea-phosphate fertilizer and two plots have been left untreated as controls. Horizontal starch gel electrophoresis was used to estimate genetic variability in these individuals. Preliminary results indicate that differential selection among allozymes is not occurring within this species in these test plots although there is a trend toward increased polymorphism in those plots receiving nutrient enrichment. This contrasts with reported results in other invertebrates subjected to heavy metals but may be explained by the ability of earthworms to concentrate and store heavy metals with little deleterious effects.

10:45 AN EXPERIMENTAL FIELD TEST FOR INTERSPECIFIC COMPETITION FOR SPACE BETWEEN TWO SPIDER SPECIES; NUCTENEA CORNUTA AND ACHAEARANEA TEPIDARIORUM Karen R. Cangialosi Dept. of Zoology Miami University Oxford Ohio 45056

A removal study was performed in order to test for the presence of space competition between members of a small community of spiders predominated by two species: Nuctenea cornuta and Achaearanea tepidariorum. Mean distance between individuals and proportions of each species occupying removal, experimental (adjacent to removal), and control areas were measured. Mean distance between all individuals in the experimental area remained approximately the same for the duration of the experiment and did not differ from the control area. Although proportions of N. cornuta to A. tepidariorum changed with time, the pattern was the same for both experimental and control areas. The individuals recolonizing the removal area were mainly juveniles and the proportion of A. tepidariorum overall was higher in the removal area as compared to both the experimental and control areas. This suggests that web sites may be limiting for juvenile A. tepidariorum and is some evidence for competition for space between N. cornuta A. tepidariorum.

SECTION R. ECOLOGY
FIRST AFTERNOON SESSION - BOWMAN ODDY 1045
SATURDAY, APRIL 26, 1986
PETER C. FRALEIGH, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 ECOLOGY KEYNOTE SPEAKER
WILLIAM C. COOPER
MANNED SUBMERSIBLE RESEARCH IN LAKE SUPERIOR

3:00 TOXICITY OF A CLONAL ISOLATE OF THE CYANOBACTERIUM (BLUE-GREEN ALGA) MICROCYSTIS AERUGINOSA FROM LAKE ERIE. Wayne W. Carmichael[1], Maria H. Pinotti[2] and Peter C. Fraleigh[2], [1]Dept. of Biological Sciences, Wright State University, Dayton, Ohio 45435, [2]Dept. of Biology, University of Toledo, Toledo, Ohio 43606.

Single cell isolates of Microcystis aeruginosa Kütz have been made from 2 M vertical haul plankton net samples, taken in Lake Erie several miles outside Maumee Bay on June 25 and August 4, 1985. Two isolates, termed O-1 and O-2 were chosen for culturing on BG-11 medium and tested for toxicity by the mouse and Daphnia assay. Lyophilized cells of both strains were toxic to mice and had an LD_{50} of between 100 and 400 mg/kg body weight. Mouse toxicity signs included: death within 1-3 hours; livers enlarged and engorged with blood (liver weight 8-10% of body weight vs. 4-6% for controls); centriobular to panlobular hemorrhagic necrosis of the liver; all other organs normal. These signs are consistent with strains of toxic M. aeruginosa studied in other areas of the world. The toxin of O-2 was purified by organic extraction, gel filtration and high performance liquid chromatography (HPLC). Purified toxin has a mouse LD_{50} consistent with other peptide hepatotoxins of M. aeruginosa. Amino acid analysis of the toxin will be presented. To our knowledge, this is the first toxic isolate of M. aeruginosa from Lake Erie and verifies that toxic cyanobacteria can be a component of it's phytoplankton population.

3:15 BACTERIAL LYSIS OF APHANIZOMENON FLOS-AQUAE. Tim Mahoney, Jeffrey C. Burnham and Peter C. Fraleigh[1], Medical College of Ohio and University of Toledo 43699.

Four bacterial strains with the ability to lyse the cyanobacterium Aphanizomenon flos-aquae have been isolated. Two have been identified as Streptomyces sp strain 30 and Streptomyces sp strain 19 while a third has been identified as a Bacillus sp strain 6919 and the fourth, strain P4 has yet to be identified. All four varieties have shown the ability to both lyse test tube cultures of Aphanizomenon in a BG11 medium and form plaques on lawns of Aphanizomenon grown on BG11 agar. Significant lysis has also been demonstrated in larger agitated liquid cultures. This bacterial lysis of Aphanizomenon is significant because this species has shown a resistance to lysis by previously tested microbial predators and it is one of the dominant species in many algal-blooms. The isolation of these bacterial predators therefore enhances the possibility for biological control of these unwanted cyanobacteria. Control of the Aphanizomenon blooms would help to reduce problems of eutrophication, cyanobacterial toxin production, taste/odor and aesthetics in Lake Erie.

3:30 THE PREDATORY EFFECT OF MYXOCOCCI IN A MULTISPECIES MIXTURE OF CYANOBACTERIA AND GREEN ALGAE. Earl C. Heath, Jeffrey C. Burnham and Peter C. Fraleigh[1], Medical College of Ohio and University of Toledo[1], Toledo, Ohio 43699

In the development of a biological control agent for cyanobacteria (blue-green algae) the bacterium for Myxococcus fulvus BG02 has been shown to lyse single species cultures of cyanobacteria. For the first time myxococci were tested over a 21 day period for their lytic effectiveness in microcosms containing equal densities of Anabaena, Aphanizomenon, Scenedesmus, and Selenastrum in a synthetic low nutrient salts medium. By day 4 the mean densities of Anabaena, Nostoc, Aphanizomenon, Selenastrum and Scenedesmus were 26%, 1%, 12%, 10%, 203% of the control densities respectively. By day 7 the Aphanizomenon was eliminated in the treated flasks; however by day 14 it had also died in the control flasks. Nostoc was not detectable by day 14 in the treated flasks. By day 21 the Anabaena and Scenedesmus had increased 50% over control densities while Selenastrum remained at about 50% of the control densities. The elimination of the Nostoc and Aphanizomenon suggests that the myxococci can exert species specific control in a multispecies system.

3:45 COPREDATION OF LAKE ERIE CYANOBACTERIA BY TWO STRAINS OF MYXOCOCCI. M. F. Cunningham*[1], P. C. Fraleigh[2], J. C. Burnham[3]. Otsego High School[1], University of Toledo[2], and Medical College of Ohio[3]. *P.O. Box 168; Tontogany, Ohio 43565.

Two strains of myxococci, Myxococcus xanthus strain WO 295 and Myxococcus fulvus strain BG02 were tested for their ability, in combination, to trap and lyse the cyanobacteria Aphanizomenon flos-aquae, Anabaena spiroides, and Microcystis aeruginosa present in samples obtained from Lake Erie. Net samples (0.07 mm) were concentrated, resuspended in Lake Erie water, and cultured in side-arm Erlenmeyer flasks. After equilibration for two days, myxococci were added to give a final density of 4×10^6 cells/ml for each strain. Daily absorbance (A630-A750nm) was determined and samples were taken for counting in a Sedgwick-Rafter cell. During the three days following myxococcal inoculation, the mean absorbance of treated flasks was 39% of that of the controls. During the same period, mean cell densities in treated flasks as a percent of those in the control flasks were 3.5% for Aphanizomenon flos-aquae, 31% for Anabaena spiroides, and 4.5% for Microcystis aeruginosa. These data suggest that these two strains may be effective as control agents in a multispecies system of cyanobacteria.

4:00 DIETS OF WHITE BASS, MORONE CHRYSOPS, AND WHITE PERCH, M. AMERICANA, FROM TWO INSHORE LAKE ERIE MARSHES. Edward E. Emmons, Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403.

Diets of white perch and white bass were compared to assess diet similarity and potential of competition between these two species. White perch, a recent colonizer of Lake Erie, has increased in abundance and may potentially effect native white bass populations. Diets of both species were examined in Sheldon's Marsh and Old Woman Creek, two shallow, inshore areas in the central basis of Lake Erie. Fish were collected from April through October, 1983 using trap nets. Comparisons of diets were made using percent composition of prey taxa by number and biomass. Results of these analyses indicated that both species fed on fish, zooplankton, and benthos. Diets differed, however, in that fish prey comprised the major component of white bass diets whereas white perch fed more on zooplankton. Both species fed equally on benthos. These data suggest that white perch and white bass diets do overlap in these inshore areas and that these species may potentially interact.

4:15 DETRITUS ASSIMILATION BY YOUNG-OF-THE-YEAR GIZZARD SHAD, DOROSOMA CEPEDIANUM. Neal D. Mundahl and Thomas E. Wissing. Miami University-Middletown, 4200 E. University Blvd., Middletown, Ohio 45042, and Department of Zoology, Miami University, Oxford, Ohio 45056.

Assimilation of organic detritus (organic matter=19%, C:N ratio=6.7:1) ingested by young-of-the-year gizzard shad (wet weight=1.5 g, standard length=43 mm) in Acton Lake, Ohio, was compared with that of fish fed two simulated detritus diets (low-quality diet: organic matter=10%, C:N ratio=14.9:1; high-quality diet: organic matter=89%, C:N ratio=6.8:1) at 18°C in the laboratory. Mean assimilation efficiencies for the total organic matter, total organic carbon, and total organic nitrogen in the diets ranged from 54-66, 51-64, and 62-84%, respectively. Fish fed the field diet and the low-quality diet exhibited greater assimilation of total organic matter and total organic nitrogen than fish fed the high-quality diet. The results indicate young gizzard shad can assimilate a significant fraction of the nutrients in detritus, and may also increase assimilation efficiency to compensate for low-quality detritus in the diet.

4:30 EFFECTS OF SUBLETHAL PHENOL EXPOSURE ON THE TEMPERATURE TOLERANCE AND LOW OXYGEN TOLERANCE OF STONEROLLER MINNOWS, CAMPOSTOMA ANOMALUM. Norman L. Chagnon and Ihor Hlohowskyj, Dept. of Zoology, Miami University, Oxford, Ohio 45056.

Stoneroller minnows, Campostoma anomalum, were exposed to four sublethal concentrations of phenol (6, 8, 10, and 12 ppm) for 48 hours, and the effects of these concentrations on temperature tolerance (CTMax) and low dissolved oxygen tolerance were observed. The mean CTMax values of fish exposed to 6 and 8 ppm phenol (35.6 C and 35.3 C, respectively) did not differ from the mean CTMax recorded for control fish (35.8 C). Although fish exposed to 8 ppm phenol exhibited loss of equilibrium at a lower mean dissolved oxygen concentration (1.5 mg $O_2 \cdot l^{-1}$) than the control group (1.9 mg $O_2 \cdot l^{-1}$), these values were not significantly different. Fish exposed to 6 ppm phenol had a significantly greater ($P<0.05$) mean oxygen tolerance (1.3 mg $O_2 \cdot l^{-1}$) than the control group Exposure to 10 ppm phenol significantly depressed temperature tolerance (34.7 C) but did not affect low oxygen tolerance (1.9 mg $O_2 \cdot l^{-1}$). The highest concentration (12 ppm) of phenol significantly reduced temperature tolerance (31.6 C) and low oxygen tolerance (2.3 mg $O_2 \cdot l^{-1}$). The results of the present study suggest that stoneroller minnows may become more sensitive to increased temperatures and decreased dissolved oxygen concentrations following exposure to sublethal phenol concentrations.

4:45 FROM WINDERMERE TO IJSSELMEER: A COMPARISON OF THE RESPONSE OF TWO LAKES TO SOLAR-DRIVEN CLIMATIC VARIABLES. John F. Wing, Wittenberg University, Springfield, OH 45501 and Eric P. Johnston, Ohio State University, Columbus, OH 43201.

Wing et al (1983) showed how the 11-yr. solar cycle set up climatic cycles which reverberated through the food web of England's largest lake, Lake Windermere, from 1934-1980. Here we report and compare similar findings for IJsselmeer, an oligohaline lake and the largest lake in the Netherlands, for 1934-1980. Sunspot numbers correlated significantly ($p<.05$) with air temperature, nearby sea surface temperature, and lake temperature; and the latter, in turn, correlated significantly ($p<.05$) with several detrended faunal series. Direct correlations between sunspot numbers and detrended faunal series yielded significant correlations ($p<.01$) for eel (Anguilla anguilla), cyprinids (bream and roach), and perch (Perca fluviatilis) and cyprinids combined; and it yielded near significance ($p<.10$) for flounder (Platichthys flesus) and pikeperch (Stizostedion lucioperca).

SECTION R. ECOLOGY
SECOND AFTERNOON SESSION - BOWMAN ODDY 1049
SATURDAY, APRIL 26, 1986
W.D. HUMMON, PRESIDING

3:00 **A EUROPEAN CLADOCERAN, BYTHOTREPHES CEDERSTRÖMI SCHÖDLER, IN LAKE ERIE: FIRST NORTH AMERICAN RECORD.** **Michael T. Bur, Sandusky Biological Station, U.S. Fish & Wildlife Service, Sandusky, Ohio 44870; David M. Klarer, Old Woman Creek Nat. Estuarine Sanctuary-ODNR, Huron, Ohio 44839; and Kenneth A. Krieger, Water Quality Laboratory, Heidelberg College, Tiffin, Ohio 44883.**

The cladoceran zooplankter Bythotrephes cederströmi Schödler (Polyphemidae) is a widespread European species.

The body of adults is 2-3 mm long with a long caudal process which is 2-3 times the body length, for a total length of about one cm. As in the North American Polyphemus pediculus, the carapace is reduced to a brood pouch. During an analysis of stomach contents of fishes collected from Lake Erie in early October 1985, numerous adults of Bythotrephes were discovered in several yellow perch (Perca flavescens), white perch (Morone americana) and white bass (M. chrysops). The fishes were collected at several stations in the nearshore open waters of the central basin between Huron and Ashtabula, Ohio. The authors subsequently recovered live Bythotrephes from plankton tows taken outside Lorain Harbor in early December 1985. To our knowledge no previous records exist of this genus in North America.

3:15 TEMPORAL CHANGES IN THE INTERTIDAL MARINE COMMUNITIES OF A TIDAL INLET AT CAPE ANN, MASSACHUSETTS. Ralph W. Dexter, Department of Biological Sciences, Kent State University, Kent, Ohio 44242

From quadrat samples of 1/4 sq.m. taken in 6 intertidal communities (sandy beaches and bars, mud flats, mussel beds, rocky shores, low marshes and high marshes) along the Annisquam Tidal Inlet at Cape Ann, Mass., temporal changes in abundance have been analyzed for 23 common and widely distributed macro-invertebrates between 1935-37 and 1956-58 (21 yr. interval), and between 1958 and 1960 (2 yr. interval). After 21 yrs., 3 spp. increased and 15 spp. decreased in general; 1 sp. increased on mussel beds but decreased on other shores; and 4 spp. had no significant change. After 2 yrs, 5 spp. increased and 7 spp. decreased in general; 1 sp. increased on low marshes but decreased on high marshes; and 10 spp. had no significant change. Three spp. showed no change during both intervals of time. In general, considerable change occurred after 21 yrs. (largely a decline), but only 52% changed after an interval of 2 yrs. The magnitude of changes was never great, and the communities remained fairly stable in composition.

3:30 THE CHIRONOMIDAE (DIPTERA) OF THE UPPER TUSCARAWAS RIVER. Christopher J. Wingard. Department of Biology, The University of Akron, Akron Ohio 44325.

Chironomid larvae were collected in the upper Tuscarawas River (Stark and Summit Counties, Ohio) from May to August 1985. Samples were taken from seven stations within a 13 km strech on two occasions by modified shovel samplers and artifical substrates. Nine hundred and ten larvae were identified. Fifty-one taxa were recognized: 25 tribe Chironomini, 18 Orthocladiini, 4 Pentaneurini, 3 Tanytarsini, and one each of Diamesini and Macropelopiini. Sixty-four percent of the genera collected were primarily collectors-gathers of algae or detritus, 11% were shredders-herbivores of leaf litter or vascular hydrophytes, and 16% were predators. Eighty percent of the genera are widespead in their North American distribution. Two genera found in the river, Procladius and Parmetriocnemus, are primarily northern genera while two others, Pedionomus and Pentaneura, are southern genera.

3:45 **The Role of Relic Bogs and Fens in the Post-Glacial Distribution of Ohio Caddisflies (Trichoptera). Ralph J. Garono and David B. MacLean. Department of Biologial Sciences, Youngstown State University, 410 Wick Avenue, Youngstown, Ohio, 44555.**

In Ohio, relic bogs and fens have existed as habitat islands since the retreat of the Wisconsinan glacier at least 10,000 years ago. Increasingly, preservation of these bogs and fens, as well as other wetlands, has become an immediate concern in natural areas management. Much emphasis has been placed on the flora, a great portion of which exists as rare or endangered species. In this study, emphasis has instead shifted to distribution of caddisflies among these habitat islands. It is known that Ohio lies on the extreme southern range for several nothern species of caddisflies. During the past two years over 20,000 adult caddisfly individuals have been collected from fourteen bog and fen sites in nine counties. Identification of these individuals has provided the baseline data needed for a preliminary study of habitat size, habitat isolation, and surrounding land use and their effect on distribution and abundance of caddisflies.

4:00 RECOVERY OF A LOTIC MACROINVERTEBRATE COMMUNITY FOLLOWING SURFACE MINING. David J. Robertson, Florida Institute of Phosphate Research, 1855 West Main Street, Bartow, FL 33830

In 1979, Mobil Chemical Company diverted 304m of a stream (Sink Branch) from its original course into a channel excavated on surface-mined land. Sink Branch is a perennial, second-order stream draining hardwood swamp, agricultural land and reclaimed, phosphate-mined land in central Florida. In 1983, the Florida Institute of Phosphate Research undertook an intensive 12-month sampling program to compare the aquatic macroinvertebrate community in the reclaimed channel with that in an undisturbed section upstream. Species richness and organism density were greater in the undisturbed channel, while Shannon-Weaver species diversity was greater in the reclaimed section. Lower richness and density values were related to reduced microhabitat diversity in the mined channel, and the greater species diversity was principally a result of more even distribution of organisms among species. Comparison of the Sink Branch data with that from other streams whose upper watersheds and stream channels were disturbed by mining clearly indicates the value of retaining undisturbed lotic habitat above mining operations. The implications of this investigation are applicable to nearly all situations in which mining occurs in riparian habitats.

4:15 BIOTIC OXIDATION IN ACIDIFIED AQUATIC ECOSYSTEMS
Jo Davison, Pres./Res. Dir.
Lambda Group, Inc. 1445 Summit St.
Columbus, OH 43201

The use of acidophilic microorganisms in coal-fines cleaning and microbial mining is well documented. At Lambda Labs, we have developed a new application that has proved effective in raising the aquatic pH and oxidizing the sulfur, iron, aluminum, and other heavy metals that come from acid mine drainage and "acid deposition". These conditions have been associated with flora and fauna kills throughout the industrialized world. Both free floating and suspended biomatrixing of symbiotic, synergistic mixotrophs from the taxonomic groups of Cyanochloranta, Chlorophyta, Chrysophyta, Mastigophora, Ciliata, and aerobic and anaerobic bacteria are employed. Oxidation of sulfur and heavy metals is rapid for the first 2-3 wks., then decreases as the pH rises and new populations gain prominence. A natural Succession occurs in each case. Without filtering off the insoluble oxidized precipitates, succession to a neutral ecosystem takes 10-12 mos. to go from pH 1 to 5.7-6.2. Filtering reduces the time to 3-6 mos. under identical conditions, as some of the oxidized metals are reduced back if left in the sludge at the bottom.

4:30 MEIOBENTHIC BIOMONITORING OF THE LAKE HOPE MINE DRAINAGE ABATEMENT PROJECT: AFTER FOUR YEARS. William D. Hummon, Department of Zoological and Biomedical Sciences, Ohio University, Athens, Ohio 45701

Research being reported here covers the four-year period following completion of construction on the project in December 1979. The aim of the project was to reduce the acid effluent from Big Four Creek (BF) into Sandy Run (SD), and thence into Lake Hope. Recovery will be indicated when 1) the arithmetic mean of order-level taxa or 2) the geometric mean abundance of the BF fauna statistically exceeds that of the SD fauna or becomes indistinguishable from that based on our unpolluted reference stream, Strouds Run (ST). Analysis by 3-way ANOVAs indicates that October samples for the four years exceeded June samples, and the richer site exceeded the poorer site with respect to taxon richness and faunal abundance; also for both categories, samples from ST exceeded those from SD, which were greater than but indistinguishable from those of BF. There was a low-level site x stream interaction for taxon richness, but not for faunal abundance; no interaction was found for either category between site x month, month x stream, or site x month x stream. While no recovery was seen between the first and the second biennia, it is hoped that the two combined can form a baseline against which a halftime of recovery can be determined.

4:45 IMPACT OF GLACIAL SILTS ON BENTHIC INSECTS OF SILVER CREEK, A NORTHEAST (PORTAGE COUNTY) OHIO STREAM.
Ed DeWalt, Department of Biology, University of Akron, Akron, Ohio 44325

Northern Ohio has numerous areas underlain with highly erodible glacial lake silts. It is not uncommon for streams to uncover these silts and develop turbid waters and silted substrates. Such an event occurred in Silver Creek, of the Mahoning River drainage, in March 1984. Qualitative investigations in October revealed an estimated 80% reduction in benthic insect taxa below the eroding silts. Quantitative investigations made in March and May, 1985 at two clear water and four silted sites indicated relatively rapid recovery of benthic insects in the silted sites. Nevertheless, Sorensen's Coefficient of Community Dissimilarity showed the greatest dissimilarity between benthic insect communities from clear and silted sites immediately below the silt outfall. The least dissimilar sites were those well downstream of the silt near the mouth. Because recolonization took place over winter, benthic insect drift probably accounted for the majority of immigrants to the recovering sites.

SECTION R. ECOLOGY
THIRD AFTERNOON SESSION - BOWMAN ODDY 1053
SATURDAY, APRIL 26, 1986
MICHAEL C. MILLER, PRESIDING

3:00 PRELIMINARY OBSERVATIONS ON THE LIFE HISTORY OF TWO SPECIES OF SOREX. J. Michelle Cawthorn. Department of Biology. Bowling Green State University, Bowling Green, OH 43403

Life histories and population dynamics of shrews of the genus Sorex, common members of many small mammal communities, are not well known. These shrews are easily wet pit-fall trapped, and often are found dead in live traps. However, despite the fact that shrews have been dead-trapped for many years, only one investigator in North America and a handful in Europe have ever successfully live-trapped Sorex. This study is an attempt to learn more about Sorex biology. Sorex cinereus, S. fumeus, and Blarina brevicauda are being live-trapped in the forested mountains of southwestern Pennsylvannia using dry pit-falls as traps. In four months I marked 56 animals on two one ha grids. Almost 50% of these animals were recaptured at least once; one was captured four times while another was captured five times. Trap success declined gradually in the summer, and abrubtly in the fall, possibly because of reduced surface activity. Shrews appear to have a center of activity which is small (100 m^2); long movements are more common in spring and early summer than in fall. The three species are most frequently captured in slightly different microhabitats; S. cinereus is the most cosmopolitan of the three in terms of habitat choice.

3:15 THE EFFECTS OF STIMULI ON AVIAN MOBBING BEHAVIOR. C. Ray Chandler. Department of Biology, Bowling Green State University, Bowling Green, Ohio 43403.

Using three combinations of two experimental stimuli (a mount and tape of an Eastern Screech-Owl), I tested the effects of stimuli on the duration and intensity of avian mobbing behavior. Out of 169 mount-only trials, only 11 (6.5%) were successful in attracting birds. Tape-only (N=169) and mount-and-tape (N=170) trials were equally successful in attracting birds (approx. 85% of all trials), but the mount-and-tape stimulus was more likely to initiate mobbing behavior. All stimuli were more likely to initiate mobbing behavior during the summer months. Birds responding to the mount-and-tape stimulus mobbed more intensely and for longer periods of time than those responding to the tape-only stimulus. These results suggest that birds are unlikely to detect a silent owl under natural conditions. However, the call of a screech-owl is readily detected and recognized and mobbing will result even without a visual stimulus. The addition of a visual stimulus provides a focus for anti-predator responses and results in maximal mobbing behavior.

3:30 HABITAT RELATIONSHIPS OF WOOD WARBLERS BREEDING IN MATURE FORESTS OF CENTRAL AND SOUTH-CENTRAL OHIO. Kenneth E. Petit, Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Habitat characteristics were studied for 15 species of warblers found sympatrically within forests of central and south-central Ohio. During 1983 and 1984, 27 habitat variables were measured in 302, 0.04-ha circular plots centered on the perch sites of singing males. Principal components analysis and field observations were used to elicit patterns of warbler habitat selection and partitioning. The first three principal component axes combined to explain nearly 75% of the total variation in habitat selection. These represented gradients from deciduous to coniferous associations, young to old-aged stands, and woodlands with an abundance of small trees to tracts with tall, dense canopies and sparse shrub layers. Most species occupied a narrow range of the entire forest gradient, generally remaining distinct from one another on the basis of habitat features. Although several groups of species shared similar habitat, they appeared to be ecologically separated on the basis of foraging techniques. With the high degree of niche separation, and the lack of interspecific aggression, competition is probably not a proximate factor affecting microhabitat distribution in this warbler community.

3:45 THE EFFECT OF INCREASED NEST BOX DENSITY ON THE REPRODUCTIVE SUCCESS OF PROTHONOTARY WARBLERS. Lisa J. Reichhardt, Dept. Biological Sciences, Bowling Green State Univ., Bowling Green, Ohio 43403, and Daniel R. Petit, Dept. Zoology, Univ. of Arkansas, Fayetteville, Arkansas 72701.

In the summer of 1985, I tested the effects of nest box density on the reproductive success of Prothonotary Warblers (Protonotaria citrea). Two hundred and fifty two nest boxes made from 1.9 l (half-gallon) milk cartons were placed in flooded riparian habitat along the Tennessee River in west central Tennessee. Nine experimental sites were established. Each site consisted of 3, 1 ha plots containing different densities of boxes: 0, 8, and 20. Prothonotary Warblers used 47% of these boxes and the number of breeding pairs per plot increased significantly with increased box density. Although clutch sizes were significantly larger on high density plots, brood sizes and numbers of young fledged were not different for low and high density plots. Only 23(13%) of 172 nests were depredated and there were no differences in predation rates as a function of density. Parasitism by Brown-headed Cowbirds (Molothrus ater) occurred in 21% of Prothonotary Warbler nests, mostly in first clutches. Rates of cowbird parasitism were similar for both low and high density plots, and there was no effect of parasitism on clutch sizes, brood sizes, or fledging success. An increase in the density of breeding pairs had no apparent effect on nesting success of Prothonotary Warblers.

4:00 The application of a chromosome technique: sex determination for interpretation of natal dispersal patterns in feral pigeons (Columba Livia). Peggy A. Kelly. Department of Biological Sciences, University of Cincinnati, Cincinnati, Ohio 45221.

In a previous study (Cincinnati Museum of Natural History, 1977-79) an increased movement of juvenile pigeons was observed during the summer months. In order to determine if such movement was a result of natal dispersal (dispersal from the site of birth to that of first reproduction) a new study was conducted at the Barrier Dam in Cincinnati Ohio. Most bird species show more extensive dispersal among females. Since pigeons are not sexually dimorphic a method was needed to determine the sex of nestling pigeons prior to fledging. Identification of sex by chromosome analysis is possible with the use of cultures of avian whole blood. Beginning in May of 1985, nestlings were taken from the nest, banded for future identification and a blood sample was taken for culturing and chromosome analysis. Observations were made on subsequent visits for indication (presence or absence) of dispersal. Of the 21 pigeons sampled, no differential dispersal by sex was observed by the end of December. It would appear that if natal dispersal does occur, it is not until the following spring mating period when these birds are into their first year.

4:15 REPRODUCTIVE SUCCESS OF HOUSE WRENS (TROGLODYTES AEDON) WITH NATURAL AND EXPERIMENTALLY ALTERED BROOD SIZES: FACTORS AFFECTING THE EVOLUTION OF CLUTCH SIZE. Kathryn D. Robinson. Dept. of Biol. Sci., Bowling Green State U., Bowling Green, OH 43403

Reproductive success of House Wrens (Troglodytes aedon) rearing natural or experimentally altered broods was assessed to determine if females were producing clutch sizes equal to the number of offspring that they could successfully rear. Number of nestlings fledged and nestling weights at 12 days old were used as measures of success. Results from natural nests indicated that parents were equally successful in rearing their nestlings, regardless of clutch or brood size, in three of four breeding periods. However, the most common clutch size was smaller than the most productive observed during these periods. Enlarged broods fledged more offspring than control or reduced broods, but the nestlings weighed less. Nestlings in broods enlarged to seven weighed less than nestlings in natural broods of seven, whereas nestlings in broods reduced to five weighed more than nestlings in natural broods of the same size. Thus, parents of natural nests with clutches smaller than the most productive may not have been able to rear successfully more offspring if nestlings that fledged at lower weights experienced higher post-fledging mortality. Natural variations in clutch size may reflect individual variation in response to parental ability or territory quality rather than selection for an optimum clutch size at the population level.

SECTION R. ECOLOGY
POSTER SESSION - STUDENT UNION, INGMAN ROOM
SATURDAY, APRIL 26, 1986

Board H @ 9:00 AM VARIATIONS IN METAL UPTAKE IN LOLIUM PERENNE-VAM ASSOCIATIONS. P. T. Arnold, C. E. Wilms, and L. A. Kapustka. Botany Department, Miami University, Oxford, OH 45056.

Seedlings of Lolium perenne were inoculated with one of four VAM isolates (Glomus epigeum, G. mosseae, G. deserticola, or Gigaspora gigantea). The inoculated seedlings were irrigated with nutrient solutions varying in toxic metal content (Cd at 1-, 5-, or 10 uM; Cu or Zn at 5-, 25-, or 50 uM). After 10 weeks post-emergence seedlings were harvested and the following data were obtained: aerial phytomass, root phytomass, shoot:root ratios, percentage mycorrhizal infection and metal content. The uptake of metals was amplified on average about 300% in all mycorrhizal associations compared to a model for passive uptake. Substantial differences in uptake patterns were evident among the four VAMs used in these experiments. These data suggest possible applications of inoculation followed by harvest-removal as a means of decontaminating soil environments.

Board I @ 9:00 AM PRODUCTIVITY AND VAM INFECTION LEVELS IN SEASONALLY BURNED PRAIRIES. Paul T. Lattimore and Lawrence A. Kapustka. Department of Botany, Miami University, Oxford, OH 45056.

Seasonal burning (Fall, Early Spring, Late Spring and Early Summer) have been conducted on the Miami University Ecology Research Center 11-yr old "prairie" for the past 3 years. Annual measures of standing phytomass and community composition reveal variable responses to seasonal burns. Measures of VAM infection during 1983 and 1984 revealed statistically higher levels of infection early in the growing season in plants from Late Spring burning treatments. Mid-summer and late summer measures of VAM infection levels reveal no differences among burn treatments. In 1985, similar measures of VAM infections were made from collections at the Konza Prairie and the Aldous Plots near Manhattan, Kansas. It is not known whether the early increases in VAM infection lead to the general increases in productivity of late summer burn treatments or if these are merely coincidental events.

SECTION S. INFORMATION AND LIBRARY SCIENCES
MORNING SESSION
WARD M. CANADAY CENTER,
WILLIAM S. CARLSON LIBRARY, 5TH FLOOR
FRIDAY, APRIL 25, 1986
GLORIA FREIMER, PRESIDING

9:00 SECTION BUSINESS MEETING

9:35 SYMPOSIUM
OHIO-BASED INFORMATION ORGANIZATIONS - DATA LINKS WITH THE WORLD
INTRODUCTION - LESLIE W. SHERIDAN

9:40 CHEMICAL ABSTRACTS SERVICE: HUB OF THE WORLD'S COMMUNICATIONS IN CHEMICAL SCIENCE AND TECHNOLOGY. John T. Dickman, Chemical Abstracts Service, 2540 Olentangy River Rd., P. O. Box 3012, Columbus, Ohio 43210

Since 1907, the American Chemical Society's Chemical Abstracts Service (CAS) in Columbus has been making the recorded knowledge of chemistry accessible to scientists and engineers worldwide. CAS abstracts and indexes more than 450,000 scientific papers, patents, and other documents on chemistry and related topics published around the world each year and disseminates the digested and indexed information to companies, universities, and individual scientists and engineers worldwide through its weekly publication, Chemical Abstracts, and a variety of other printed, microform, and computer-based information services. CAS has pioneered in developing methods for both automated processing and automated searching and retrieval of scientific and technical information and provides worldwide online access to a massive computer database of chemical information from Columbus.

10:00 THE ONLINE COMPUTER LIBRARY CENTER, INC. Mary Ellen Jacob, Vice President, Library Planning, OCLC, 6565 Frantz Road, Dublin, Ohio 43017.

OCLC was founded in 1967 by the Ohio College Presidents Association to provide information services for their libraries. OCLC's corporate charter states: "The purpose or purposes for which this Corporation is formed are to establish, maintain, and operate a computerized library network and to promote the evolution of library use, of libraries themselves, and of librarianship, and to provide processes and products for the benefit of library users and libraries, including such objectives as increasing availability of library resources to individual library patrons and reducing the rate-of-rise of library per unit costs, all for the ever-expanding body of worldwide scientific, literary, and educational knowledge and information." Key in that statement is "further access to the ever-expanding body of worldwide scientific, literary, and educational knowledge and information." OCLC has grown from two people in 1967 to some 900 in 1986, supplying computer-based information services to over 12,000 libraries worldwide. These services encompass support for traditional library services such as cataloging, acquisitions and interlibrary sharing as well as exploring new services including electronic document delivery and electronic publishing.

10:20 THE ERIC CLEARINGHOUSE FOR SCIENCE, MATHEMATICS, AND ENVIRONMENTAL EDUCATION - A NATIONAL AND INTERNATIONAL INFORMATION RESOURCE
Dr. Robert W. Howe, ERIC/SMEAC, The Ohio State University, 1200 Chambers Road, Room 310, Columbus, OH 43212

ERIC is a national educational system developed in 1966 to acquire, select, and process information into the ERIC databases. In addition, clearinghouses produce research reviews, bulletins, digests, directories and other materials for a variety of users. ERIC can be accessed by manual and online procedures throughout the U.S.A. and throughout much of the world. ERIC has a unique microfiche service with microfiche collections at more than 700 sites throughout the world. This presentation will consider current and future activities of the clearinghouse and the ERIC system and how the system networks and interacts with users.

10:40 **ONLINE WITH THE WORLD'S INFORMATION. Wm A. Jenkins, Mgr, Online Database Services, Predicasts, 11001 Cedar Ave, Cleveland, Ohio, 44106.**

Databases have become vital sources of information in the business and technical world. This paper will explore the types of information now available online and currently being accessed by researchers in most major corporations and research firms. New technology, management, R&D, government regulation and patent information of key importance to new product and company research is available for virtually every industry, gathered from international business, defense and scientific publications. Database producers, such as Predicasts, have begun to apply vast database files to the research needs of individual industries, including but not limited to the medical and healthcare, legal, chemical, electronic and defense markets. Information typically may be available in hard copy, as well as online in the form of abstracts, indexes or full-text, to provide all researchers with instant access to information previously difficult or impossible to obtain.

11:00 INFORMATION MANAGEMENT: STRATEGIES FOR SURVIVAL

Sharon A. Leigh, Senior Market Analyst
Mead Data Central, Inc.
P.O. Box 933
Dayton, Ohio 45401

This paper explores opportunities for information specialists as an increasingly competitive business and research environment transforms information into a strategic weapon. The challenge for information specialists is to position themselves and their information centers as fulcrums upon which the information needs of their employers revolve. By coordinating and building bridges among the information activities of each department, educating management about the applications of information technology to its tasks, and training users in the optimum use of these technologies the information manager can become an influential strategic planner rather than a service activity cost center.

The information specialist is in a unique position to take the lead in answering academic, institutional and corporate information needs through the implementation of new technologies and research techniques. Examples of these from Mead Data Central, the leading online provider of full-text information and an increasingly important source of bibliographic and reference material, are discussed in detail. Specific databases for scientific and research communities are highlighted.

11:20 QUESTIONS AND ANSWERS

SECTION S. INFORMATION AND LIBRARY SCIENCES

AFTERNOON SESSION
WARD M. CANADAY CENTER,
WILLIAM S. CARLSON LIBRARY, 5TH FLOOR
FRIDAY APRIL 25, 1986
BILLIE BROADDUS, PRESIDING

1:30 THE EVOLUTION OF ASTRONOMICAL DATA FILES. Ginger C. Bopp and Bernard W. Bopp. Carlson Library and Dept. of Physics and Astronomy, University of Toledo, Toledo, OH 43606

The lifetimes of stars range from about 10^7-10^{10} years, and changes in the structure or luminosity of a star as it ages may be perceptible only on time-scales of decades or centuries. Thus archival information on characteristics of individual stars from 50-100 years ago may be of considerable interest to the modern astronomer. In this paper we outline the development of systems that reference data on individual stars. In many respects retrieval of astronomical data is a microcosm of information access during the last three decades. In the 1950's and 1960's printed yearly indexes were the only access tools. The 1970's saw the establishment of a central information bureau in Strasbourg (the CDS) which published many new catalogs and cross-references and gave them wide (and very cheap) distribution via magnetic tape and microfiche. Within the last five years, NASA has developed and made available online data services that can be accessed by essentially any terminal and modem.

1:45 OHIO UNIVERSITY LIBRARIES' INTERNATIONAL PROFESSIONAL INTERNSHIPS By K. Mulliner; Presented by Anne Goss, Assistant Director of Libraries, Health Sciences Library, Ohio University Library, Athens, OH 45701-2978

Since 1979, Ohio University Libraries have offered international internships to more than 30 professional librarians, primarily from Asia and the Pacific. With sponsorship from a variety of federal and international agencies and the home institutions, the interns engage in individually tailored programs ranging from one month to one year. Through the internships, the O.U. Libraries have gained new perspectives on its own operations and have developed many new international linkages. The framework of the internships is described with emphasis on lessons learned over the years and suggestions for other institutions seeking to establish such linkages.

2:00 THE UNIFORM LIBRARY CATALOG

William L. Buckel, Battelle-Columbus Division, 505 King Ave., Columbus, Ohio 43201

Librarians are in almost unanimous agreement that the application of digital-computer technology to the library catalog will yield improved information retrieval and save a lot of card filing. There is, however, a price one must pay as public catalogs become more sophisticated and more custom fitted to each library's needs. One obvious "cost" is a loss in reliability. Another cost is the potential for loss in library-to-library uniformity offered by the common card catalog. The author advocates offering the public a choice of two computerized catalogs. The unique local catalog and a second catalog called the "Uniform Catalog". Operating characteristics of the Uniform Catalog are described.

2:15 TOLEDO'S GOVERNMENT PROCUREMENT CENTER: THE LIBRARY'S ROLE IN FEDERAL CONTRACTING. Galen Avery, Toledo-Lucas County Public Library, Business Department, 325 Michigan, Toledo, OH 43624

The U.S. government is interested in increasing competition for its contracts, and the small-business community is interested in increasing its participation in this potentially lucrative field. Unfortunately, a variety of informational problems stands between the two. TLCPL and the Lucas County Improvement Corporation operate a resource center dispensing data, general information, and referral services to businesses in Northwest Ohio. Specifications, regulatory material, contracts to be let, and cost accounting standards are all available in one centralized location.

The Government Procurement Center has been in operation for 2½ years, and has worked with nearly seventy companies which have been awarded over $4 million in federal contracts. It was the first such library-operated program in the United States. This paper addresses the origin, operation and function of this unique and successful program.

2:30 BARRIERS TO RESEARCH COMMUNICATION POSED BY INFORMATION COMPUTERIZATION. Margaret B. Guss, Collection Management Dept., Univ. of Akron Library, Akron, OH 44325.

Computer advantages of speed, data manipulation, and thoroughness are well known. All these aspects are useful in the storage, retrieval, and transmission of information. This paper will consider the opposite side of the situation--computer barriers to research communication. The economic barriers alone may be sufficient to keep individuals or segments of society outside the circle of information transfer or to cause only selective information storage. Intellectual problems of systems access and political-legal problems of information ownership are but two more

considerations in a complicated system of communications. The roadblocks to research dissemination that the information technology revolution causes need to be recognized so that policies and procedures to alleviate the problems can be formulated.

2:45 THE LIBRARIAN AND THE RESEARCHER: AN ESSENTIAL LINK
Marian Winner
Science Library
Miami University
Oxford, Ohio 45056

While the world of scientific literature continues to grow at an astronomical rate, its basic structure remains the same. With improved technology, some of the materials may change format from hard copy to electronic, but the need to access them will remain unchanged. Informal communication among scientists will continue to be an important tool for information exchange. Technology will also allow this exchange to take place more rapidly. Information on specific experiments or techniques may flow from one researcher to another, but each researcher still needs to access and obtain specific information from the vast stores of scientific literature in the world. In order to do this effectively, the librarian or information specialist will remain an essential link between the researcher and the specific information that has already been created. The existing knowledge or the lack of it determines the direction or need for research. The role of the librarian or information specialist must continue to move from the passive mode of communicator or advisor where end user searching is involved.

3:00 BREAK

3:15 LIBRARIES: A BROKEN LINK IN THE INFORMATION CHAIN? T.R. Sink, Health Sciences Library, Mercy Hospital, 2200 Jefferson Ave., Toledo, OH 43624

A library's place in the learning process is well documented. Since the dawn of the "Information Age", libraries have enhanced their traditional image as a repository of books by becoming information centers. Showcasing electronic access to vast reservoirs of data, the modern library has moved outside the confines of walls and space limitations to service the multidisciplinary information demands of its clientele. Today's librarian must be an information specialist, able to collect, organize, maintain, and disseminate tremendous quantities of data in a variety of formats.

The proliferating use of microcomputers, both at home and work, has now given the "end-user" nearly equal access to data which was formerly exclusive to libraries. Arguments by librarians who are opposed to researchers accessing data files are mostly unfounded. A librarian's reluctance to become involved in end-user activities may have potential for adversely affecting library utilization.

To promote better public relations, librarians should use their experience and training to help scientists and researchers become more self-sufficient by teaching proper data searching techniques and by providing a centralized consultation resource and referral service. Librarians should be careful to promote a positive image to remain a viable component within their organization.

3:30 A PHASE APPROACH TOWARDS DEPARTMENTAL END-USER DATABASE SEARCHING. Chris J. Miko, Science Library, Bowling Green State University, Bowling Green, OH 43403

End-User computer database searching by teaching and research departmental faculty can be efficiently implemented by utilizing a systematic three phase approach. The first phase involves the identification of an interested faculty member within the department. This individual will receive adequate levels of computer database searching training. In-house training must be complemented by formal vendor or database producer seminars. Once training has been completed, the faculty member should begin accepting database searches from other faculty and graduate students in the department. For an initial period of time, a librarian should offer and provide appropriate assistance. The second phase involves the training of other interested faculty by their trained and experienced colleague. The third phase involves the integration of end-user computer database searching into graduate research methods courses. This instruction could be managed by either a librarian or by searchers within the department. Through this phase approach, training can be better controlled and monitored, thus maintaining search quality. Also, a wider population is ultimately exposed to end-user searching.

Panel Discussion - Library Directors

3:45 BOWLING GREEN'S LIBRARY MATERIALS: OPPORTUNITIES FOR INTERNATIONAL RESEARCH. William Miller. Dean's Office, Bowling Green State University Libraries, Bowling Green, Ohio 43403-0170.

Several collections at Bowling Green State University Libraries present the researcher with national and international research opportunities. Foremost among these are the collections of the Institute for Great Lakes Research, which encompass the entire U.S. and Canadian Great Lakes region; the collections of the Popular Culture Library, which is the nation's largest such collection and which is expanding into the area of international popular culture; and the Music Library, which houses one of the nation's largest collection of sound recordings. Indexes and online databases serve as gateways into the world's scientific and other literatures. Infolink, a fee-based information service, allows provision of services to the Ohio business and academic communities and to any other inquirers in the nation and world.

3:55 TLCPL - A COMMUNITY RESOURCE PROMOTING RESEARCH AND EXCELLENCE. Clyde S. Scoles, Director, Toledo-Lucas County Public Library, 325 Michigan Street, Toledo, OH 43624

Toledo-Lucas County Public Library serves a wide audience with a broad range of subject expertise. Its Science-Technology Department emphasizes materials for scientists, inventors, patent attorneys and students. The Business Department serves researchers with historical collections of corporate information and current data base information. Social Science has valuable resources in its Community Information File and Grantsmanship Center. Toledo area history can be researched in some depth in the Local History Department. Public Information designs and publishes booklist and pathfinders and coordinates library orientation tours.

4:05 COLLABORATIVE PLANNING AND NETWORKING
WATTERSON, R. M.
Librarian
Raymon H. Mulford Library
Medical College of Ohio
3000 Arlington Avenue
Toledo, Ohio 43614

The history of cooperative ventures linking medical libraries within the state and medical libraries outside its geographical boundaries are explored. Federal suggestions on collaborative planning and networking to dispense biomedical information to health care provisioners nationwide are discussed, along with the opening of Ohio's medical libraries to all its citizens. The chronicle of pioneer efforts in the breakthrough of automated bibliographic retrieval systems are described; including the world's first on-line system as it affected medical libraries in the United States; and the emergence of data base vendors in the medical library arena. Current methodology and plans for the future are presented in the areas of interlibrary loan, reference, and administration.

4:15 LIBRARIES LINK RESEARCHERS WITH INFORMATION ACROSS THE NATION AND THE WORLD. Leslie W. Sheridan, Carlson Library, University of Toledo, Toledo, Ohio 43606.

Links with the nation and the world are accomplished in a variety of ways. First, libraries establish collections in varying formats and from diverse sources. Each library has its own unique special collections. Beyond traditional sources of information are other and newer avenues. These include data base searching, other data bases like Compustat, microfilm collections and interlibrary loans now

from places such as the British Lending Library and the Center for Research Libraries. On the horizon are full-text searching, such as the presently-existing LEXIS system for law libraries. Individual faculty are increasingly learning to 'talk' with fellow researchers using BITNET. They are using home computers and telephone modems to interface with campus mainframes. The future offers the possibilities of on-line catalogs, telefacsimile delivery of documents, transmission via TV satellite dishes, downloading of data bases. Libraries face the challenge of instructing faculty and students in the effective use of such sources through formally established programs. Interlibrary cooperations forged these links and newer technologies will enable them to grow to enhanced levels. The library role may change but it will still be one of intermediary - certainly for undergraduates and very likely also for graduate students and faculty.

4:25 Questions and Comments

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THE OHIO ACADEMY OF SCIENCE - Program Planner for the Annual Meeting

Time	Event or Paper	Place
8:00 - Registration and Coffee -		
8:15 -		
8:30 -		
8:45 -		
9:00 -		
9:15 -		
9:30 -		
9:45 -		
10:00 -		
10:15 -		
10:30 -		
10:45 -		
11:00 - All Academy Lecture - 12:00 - Lunch 1:30 - Section Business Meeting		
1:45 -		
2:00 -		
2:15 -		
2:30 -		
2:45 -		
3:00 -		
3:15 -		
3:30 -		
3:45 -		
4:00 -		
6:30 - Academy Banquet - 7:30 - Awards and President's Address - 9:00 - Annual Business Meeting and Election of Officers		